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Foreword

The bi-annual publication of BNR Economic Review intends to avail information to the public on economic matters, focusing on features and challenges of the Rwandan economy. This 15th volume of BNR Economic Review consists of four research articles touching on topical issues related to financial sector performance and external sector sustainability in Rwanda. The papers aim to provide concrete evidence-based analyses and policy recommendations that can help to improve the effectiveness of financial and monetary policies in Rwanda.

The first three articles focus on financial sector development in relation to economic growth and transformation. The first article narrates the financial sector development in Rwanda over the last two decades and investigates its linkages with the country's economic performance. The purpose is to evaluate the economic impact of recent reforms in the financial sector in the long-run. The paper shows that, in addition to increased number of financial institutions and competition, improvements were recorded in various dimension including size, solvency, efficiency, risk management and intermediation. A Johansen cointegration analysis suggests bi-directional causality between financial development and economic growth in the long run, thereby confirming the hypothesis that financial development has been important for economic growth in Rwanda and vice versa. Deeper analysis unveils some sectoral heterogeneity that suggest that the finance-growth linkages are stronger in the services and industry sectors, compared to the agriculture sector. From a policy perspective, these findings imply that, in order to sustain synergy between financial development and economic growth, concurrent efforts are needed to support the transformation and stability of the financial sector, and to strengthen and diversify economic growth across all sectors. The findings support ongoing efforts to de-risk all sectors of the economy, especially the agriculture sector.

Cognizant of the potential of the manufacturing sector performance for rapid economic growth and structural transformation, the second and third papers in this volume set out to assess manufacturing firms' access to credit and capital markets in Rwanda. The second paper argues that the sluggish performance of the manufacturing sector could be partially attributed to inadequate access to credit among manufacturers in Rwanda, and credit constraint is a result of information asymmetry between banks and manufacturing firms that leads to credit rationing.

From this standpoint, the paper employs data from a survey on access to finance among 122 manufacturing firms to analyze two dimensions of credit constraint, namely, credit-discouragement and loan rejection. The survey data are also employed in a probit regression model to test the hypothesis of information asymmetry. The results of descriptive analysis show that, in 2018, around 27 percent of manufacturing firms were credit-constrained, and the prevalence of credit constraints was higher among smaller, younger, financially opaque, innovative and landless firms, signaling potential incidence of information asymmetry between banks and manufacturing firms. Probit model estimation results vindicate this assertion, showing that the likelihood of credit constraint decreases significantly with firm size, age and bank visits, and increases with product innovation. These findings suggest that lack of sufficient collateral or lengthy credit history among smaller and younger firms, as well as manufacturer's informational advantage over the lender, potentially lead to credit rationing by banks. The negative impact of information asymmetry on firms' access to credit implies that policy initiatives that aim to alleviate information asymmetry on the credit market (e.g. credit reference bureau) and those that offer guarantee schemes to smaller and younger firms could positively support industrial development by relaxing credit constraints.

Domestic capital markets provide an alternative source of external financing to supplement bank credit, especially for sectors with continuous technological advances such as manufacturing. With this consideration, the third article investigates manufacturing firms' access to capital market. The paper narrates recent developments in capital market in Rwanda, showing significant increases in annual growth in outstanding T-bonds, accompanied by a broadening investor base (from a bank-dominated to a diversified portfolio including institutional investors and retailers). The paper uses data from a nationally representative survey on access to finance among 122 manufacturing firms to analyze firm characteristics vis-à-vis the requirements for listing on the bourse. The paper draws from insights of the theory of planned behavior to investigate manufacturers' intention to enlist on the bourse based on their attitudes toward capital markets, subjective norms, and perceived behavioral control. The results of descriptive analyses show that a substantial share of manufacturing firms meet the basic requirements. Yet, only 1 percent had issued debt security or equity capital by 2018. Manufacturers report low levels of awareness and reluctance to share the control of their firms. Nevertheless, the results suggest

that manufacturers' intentions to enlist is generally positive, especially in the long term. Moreover, 93 percent of firms believe that capital market is a very relevant source of financing for their businesses. They perceive debt security and equity capital as less costly sources of external financing. Manufacturers also perceive participation in capital markets as a normal practice in the industry. With regard to perceived behavioral control, about 50 percent of manufacturing firms in Rwanda reportedly lack the necessary skills to enlist on the bourse. Around 50 percent of firms perceive that they have the required reputation to attract investors, and 48 percent believe that they use the required accounting standards. Based on these findings and drawing from the experience of countries with developed capital markets, the paper recommends to step up educational campaigns, and advocates the restructuring of manufacturing firm governance towards increased transparency. Furthermore, the paper recommends increased role of institutional investors in easing manufacturing firms' access to capital markets.

The last paper aims to assess the current account sustainability in Rwanda, using the External Sustainability method, developed by the Consultative Group on Exchange Rate Issues at the International Monetary Fund. It uses data covering the period starting from 2010 to 2018 as actual numbers and 2019 to 2021 as medium-term projections, and to determine the current account to GDP ratio that would stabilize the Net Foreign Assets to GDP position over the medium term at a benchmark or desired level. The findings show that over the medium term (2019 and 2021), the current account gap will average 0.8 percent closer to the conditions of stability of the current account, thereby implying a minor impact on the level of external debts needed to sustain projected current account deficit levels. Therefore, ensuring stable macroeconomic and business friendly environment in Rwanda is paramount, in order to attract concessional and long-term flows, which are usually less volatile.

Comments and questions can be sent to the Director of Research on phitayezu@bnr.rw, KN 6 Avenue 4, P.O Box 531 Kigali-Rwanda.

RWANGOMBWA John
Governor



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Financial sector development and impact on economic growth in Rwanda

Christian Nyalihama¹

Callixte Kamanzi²

¹ Manager, Economic Research Division, National Bank of Rwanda

² Economist, Research Department, National Bank of Rwanda



Abstract

For the last two decades, Rwanda economic performance has been strong along with developments in financial system. Although the literature on finance-growth nexus is vast, this has stirred debates especially on direction of causality. The present study examines developments observed in the financial sector in Rwanda and its linkages with economic performance. Our analysis underlines financial sector developments in Rwanda for the last two decades and in various dimension including size, solvency, efficiency, risks management and intermediation notably in financing the economy. In addition, Johansen cointegration analysis suggests bi-directional causality between financial development and economic growth in the long run, thereby confirming that financial development is important for economic growth in Rwanda and vice versa. Sectoral analysis highlights some sectoral heterogeneity, as finance-growth link is more evident in services sector and industry sector. These findings underscore that high and diversified economic growth and financial sector development, would be crucial to sustain the ongoing development journey.

Keywords: Economic growth, financial development, Rwanda

JEL classification: E44; G21; O16.



1. Introduction

For the last two decades, Rwanda has recorded an impressive economic growth, modernization across all sectors and embarked on an ambitious development strategy seeking to transform the country from a low-income, agriculture-based economy to a strong and diversified economy going forward. As a result, Rwanda is among the fastest growing economies in Africa with the average economic growth of 8% over the last two decades, with many encouraging developments observed in both economic and social development indicators. The financial sector has also positively evolved along with the real sector, and in various aspects such as size, number of institutions and financing the economy.

As part of its long-term vision strategies, the Rwandan Government recognized the need to develop a stable, efficient and sound financial sector that is sufficiently deep and broad, capable of efficiently mobilizing and allocating resources to address the development needs of high levels of saving and private investment, as well as reducing the dependence on external aid.

Literature has underscored that a sound, inclusive financial sector can be an important factor for growth and socio-economic development in any country, helping to reduce poverty and support livelihoods by improving access to financial services (see for example King & Levine, 1993; Beck, 2013). On the empirical front, the nexus between financial development and economic growth has generated debates on whether it is the supply-leading hypothesis, the demand following hypothesis or the bi-directional relationship that holds or whether there is no relationship at all. On one side, supply-leading hypothesis suggests that financial sector development leads to optimal allocation of resources by minimizing transaction costs and information asymmetry, facilitating financial intermediation and availing a wide range of financial services, which ultimately leads to economic growth. In short, causality runs from financial development to economic growth. On the other side, the demand following hypothesis proposes that economic growth leads to an increase of demand for financial services, hence causality runs from economic growth to financial development (Hurlin & Venet, 2008). Despite some disagreements about the role of financial development in economic growth, the body of country-studies (for instance King & Levine, 1993; Levine, 1997; Zhang, et al., 2012; Ngongang, 2015; Bist, 2018)



pointed out that well-developed financial system support faster economic growth by mobilizing savings, allocating funds to investment, and redistributing risks.

Rwanda growth performance for the last two decades has been concomitant with development in all sectors of the economy including the financial sector. Nevertheless, though financial sector has expanded and diversified especially in last 10 years, the latter is still at early development stages and has been financing a relatively small portion of economic agents in Rwanda. This paper examine the link between financial sector development and economic growth in Rwanda and assess whether this relationship exhibits heterogeneity across economic sectors.

Previous study by Kigabo, et al. (2015a) assessed the relationship between financial development and economic growth in Rwanda and found that credit to private sector positively affects economic growth. A recent study by Karangwa and Gichondo (2016) attempted to examine finance and growth links by economic sectors and suggested a two-way causality, though causality running from growth to credit is more significant. This study expands the analysis especially on financial sector development, looking at financial sector evolution on various aspects including efficiency, market structure, soundness and financial intermediation. Besides, the present paper assess the long run relationship between financial sector development and growth nexus at aggregate level and reexamines the nexus at sectoral level using recent data.

The main objective of this paper is to assess developments observed in the financial sector in Rwanda and its linkages with economic performance.

The role of finance in economic growth is an important policy issue and this has different implications especially in case of developing countries where, financial sector is usually shallow and a number of structural policies and plans devised to boost long-term economic growth highlight the prominence of finance in the development process. Assessing the role played by finance in the growth path of Rwanda would shed more lights on this issue and influence policymaking going forward, in devising appropriate policies to sustain strong economic growth and promoting financial sector development. In addition, Rwanda long-term development plan aims at making Rwandan economy a financial hub that, would eventually ease



access to finance and promote investment, but also as an economic sector itself, creates jobs, value addition and wealth.

The structure of this paper is as follows: the next section reviews the main developments observed in Rwanda financial sector for the last two decades. Section 3 reviews the literature on finance-growth nexus. Section 4 explains the methodology used. Section 5 details empirical results and section 6 concludes.

2. Financial sector development in Rwanda

The development of the financial sector before the genocide against the Tutsi in 1994 was slow. At that time, only 3 commercial banks and 2 specialized banks operated with a total of less than 20 branches in the country, and one microfinance (UBPR) with around 146 branches (BNR, 2004).

Since 1994, Rwanda's financial sector has made great strides. It consists of a wide and growing array of institutions: Banks, microfinance institutions, savings and credit cooperatives (SACCOs), insurance companies, and pension funds. In addition, capital market provides an expanding range of saving products and source of mobilizing financial resources for the Government to finance its expenditures.

In 2011, the financial system stability assessment conducted by the International Monetary Fund (henceforth, IMF) underscored National Bank of Rwanda (henceforth, NBR) performance in pursuing reforms that helped to improve the structure and operations of the financial system, modernize its infrastructure and strengthen the framework for monitoring and mitigating systemic risks (IMF, 2011).

As at end December 2018, the financial sector consisted of 504 institutions: 16 Banks, 459 Microfinance institutions, 16 Insurers and 13 Pension Schemes (these include 1 mandatory Pension scheme and 12 Voluntary Pension Schemes). Banks continue to hold the largest combined share of financial sector assets at 66.7 percent by December 2018 followed by the pension sector with a market share of 16.7 percent while the insurance and microfinance sectors hold 9.8 percent and 6 percent, respectively (NBR, 2019). Yet, the change over time is noteworthy. Before 2008, the banks' combined share was over 80 percent, implying more diversification in financial



sector in recent years. This is a positive development especially in terms of financial breadth. In terms of assets, the ratio of total assets (of the financial sector) relative to GDP increased to 56.3 percent in 2018 from 5.2 percent in 2007.

The growth of financial sector over the past 25 years is attributed to various factors including the conducive macroeconomic environment and entry of new market players. More notably, the NBR has put in place important reforms to ensure that the financial system continue to be sound. These reforms included the establishment of appropriate market infrastructure (efficient legal and regulatory framework, supervisory tools, modern payment systems and the private credit reference bureau). In addition, the NBR established the Financial Stability Committee (FSC) in May 2012 with the mission to promote the stability of the Rwandan financial system by analyzing the system in its environment on a permanent basis, and by identifying, monitoring and publishing associated risks. It has therefore ensured the stability of the sector by mitigating and containing risks that may disrupt its performance and ultimately, the real economy.

2.1. Banking sector development in Rwanda

The size of banking industry has consistently been expanding since 1995 on the back of financial sector development program adopted by the Government, strong legal and regulatory environment enforced by the NBR to comply with international standards and best practices, financial liberalization, and entry of new banks in the market. As at end December 2018, the banking sector was composed of 11 commercial banks, 3 microfinance banks, 1 development bank and, 1 cooperative bank. The banking sector operates a network of 189 branches, 175 sub-branches and 153 outlets across the country.

The banking sector is currently solvent, profitable, and holds sufficient capital and liquid assets buffers above the minimum regulatory requirement. The asset quality of the banking system improved with the Non-Performing Loan (henceforth, NPLs) ratio, the main indicator of assets quality for the Banking sector reducing from 26.0 percent in December 2006 to 6.4 percent in December 2018, though it is still above the NBR target of maximum 5 percent. The stress testing performed by the NBR in 2017 shows that the Rwandan banking system is resilient with higher capital buffers



and liquidity covers. The adverse loan defaults shock would have a moderate impact on the overall solvency of the banking system despite few individual institutions falling below the regulatory capital (15 percent) and the tests of the impact of withdrawal of deposits suggested minimal impact of the banking system liquidity position as well (NBR, 2017).

2.2. Microfinance institutions highlights

Microfinance initiatives mushroomed from 2002, primarily as a response to the weak involvement of the traditional banks in small and micro enterprises, and rural areas. The microfinance sub-sector, which constitutes of microfinance institutions with limited liability status as well as saving and credit cooperatives (SACCOs), remains an important component of the financial sector especially through its role in driving financial inclusion. The presence of microfinance institutions in all administrative sectors (Imirenge) of the country reduces the distance to a formal financial institution thereby eliminating the access barrier to financial inclusion. According to the financial inclusion survey (AFR, 2017), around 2 million adults had/used Umurenge SACCO accounts for saving or borrowing in 2016.

Because the microfinance sector largely serves the rural population of which more than 70 percent is involved in agriculture, the growth of deposits and loans of this sector reflects the farmers' access to financial services. This has partially solved the structural problem of insufficient financial capital by farmers, as they can now trade their produce, save generated revenues, and borrow from nearest microfinance institution.

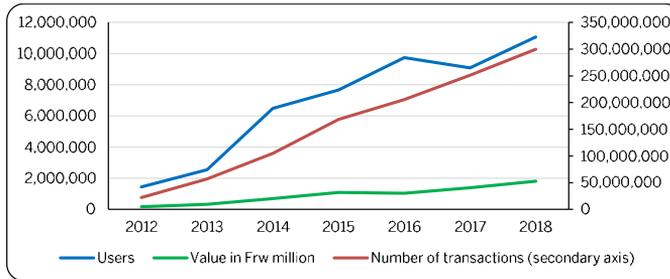
2.3. Payment systems modernization

In the last two decade, Rwanda payments system underwent significant changes, by introducing new financial products such as Automated Teller Machines (henceforth ATMs), point of sales (henceforth, POS), as well as mobile and internet banking. Between 2011 and 2018, retail e- payment as percentage of GDP increased from 0.3% to 34.2%. The value of mobile money transactions increased from 51,024 to 1,808,943 million FRW, the value of ATMs transactions increased to 530,000 FRW



millions in 2018 from 122,974 FRW millions in 2011, while the value of POS transactions increased from million FRW 6,438 to 85,000 in the same period.

Figure 1: Evolution of mobile money users and transactions



Source: NBR (2019)

2.4. Capital market developments

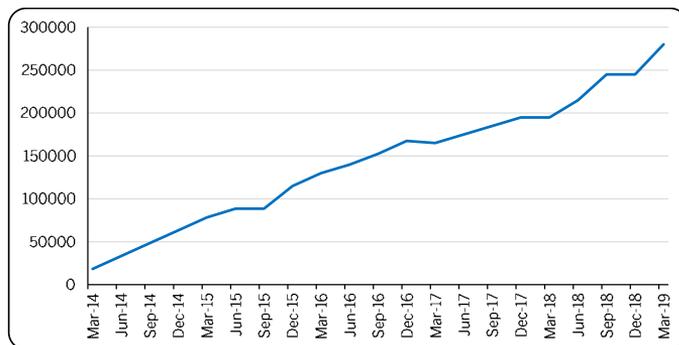
With an ambition to develop a more resilient, reliable and diversified financial sector, the Government of Rwanda considers the capital market as an alternative source of finance for big investments that will drive the economy on its path to growth and development, and a channel for long-term savings and investment. Rwanda’s capital market was established in 2011 under the Capital Market Act of 2011, to guide in the development of capital markets.

Prior to the establishment of the Capital Market Authority (henceforth, CMA), the Rwanda capital market advisory council had been established in 2007 to develop the capital market in Rwanda, facilitate the trading of debt and equity securities and enable securities transactions, as well as perform regulatory functions over the Rwanda Stock Exchange (henceforth, RSE). From then to now, a solid foundation has been put in place through a robust legal and regulatory framework and important milestones.

The Treasury bond is one instrument widely used to develop capital market, due to high level of trust to the Government, hence lower risks of investing in T-bonds. The

terms on which a Government can sell bonds depend on how creditworthy is rated by the market. In Rwanda, bonds are issued on quarterly basis for maturity period 2, 3, 5, 7, 10, 15 years and there are plans to make this period longer in future, starting with 20 years maturity in 2019. In a bid to develop the Rwandan bond market, the Government of Rwanda in collaboration with NBR published its quarterly bond issuance program in February 2014. Subsequently, total outstanding bond significantly increased, with better diversification of investors.

Figure 2: T-Bonds outstanding (in billions of FRW)

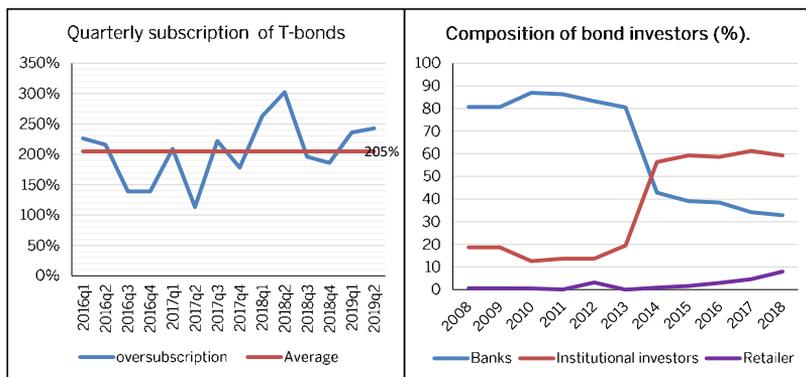


Source: NBR (2019)

All T-bonds issuances have been oversubscribed showing the appetite of economic agents to invest in Government securities and that the bourse presents an immense opportunity to mobilize funds. Capital market in Rwanda is providing saving opportunities to more economic agents. Investor base broadened since 2014 due to collective effort of public awareness campaigns across the country and within the region. Banks share in total T-bonds declined from 80.7% in 2008 to 32.8% end 2018. The share of institutional investors increased from 18.7 percent in December 2008 to 59.2 percent end 2018, and the share of retail investors increased to 8.0 percent from 0.6 percent in the same period.



Figure 3: T-Bonds subscription



Source: NBR (2019)

Since the establishment of capital market in Rwanda, a total of FRW 97.3 billion were raised through the sale of 4 companies shares to the public, and FRW 302.75 billion through issuance of debt securities. Eight companies (four domestic) and 17 bonds are listed on the secondary market, and by August 2018, the RSE market capitalization stood at 41 percent of the Rwanda GDP.

A number of initiatives were adopted to develop the secondary market, to increase the number of participants and making the market liquid, while encouraging companies to issue corporate bonds. Since 2013, the RSE published rules pertaining to the listing of SMEs. Some companies are under advisory process expecting to be listed soon. So far, a lot of work has been done for assisting them restructuring their business and preparing required documents before going public.

Various public education sessions were organized by CMA countrywide, targeting retail or individual investors across the country to create awareness among investors. Capital market investments' clinic was adopted, where companies are assessed, and advised with the intention of helping those businesses to improve their financial records, and strengthen their corporate governance. Information on the importance and benefits of saving and investing through the capital market is disseminated, with an emphasis on embracing the saving culture.



More importantly, NBR undertook measures to increase market liquidity such as facilitating bonds trading on the secondary market. An investor who needs back her/his money before the maturity date, he/she is advised to trade the treasury bonds on the secondary market at RSE with the assistance of brokers. The NBR rediscount the bonds as a last resort at 3% below the prevailing market yield or coupon rate whichever is higher, upon written confirmation that there is no buyer from the RSE.

3. Literature review

Literature on the nexus between finance and growth started long time ago, although this interest was reignited in early 1990s. Initially, the body of research on the nexus between financial development and economic growth dates back as least to the theory of economic development by Schumpeter (1912) and the debate ensued. On one side, a number of authors such as Lucas (1988) and Robinson (1952) dismissed the role attributed to finance in economic growth, while on the other side, from Bagehot (1873) to McKinnon (1973), authors insisted on the importance of finance in understanding economic growth (Levine, 2005).

Over the recent years, researchers have continued to investigate the link between financial development and economic growth. Yet, there is no consensus on this relationship. Theoretical literature have shown that finance plays a role in economic growth although this role can be ambiguous (Beck, 2013). Empirical studies also offered contradictory evidences. Consequently, the verdict on the financial development-growth relationship has remained at some extent, inconclusive.

The level of development of an economy also has implications on the strength of finance-growth nexus according to recent empirical evidences. Aghion, et al. (2005) underlined that this nexus is stronger in low and middle-income countries, which still have potential for productivity growth compared to developed countries, whereas Herwartz and Walle (2014) argued that impact of finance on economic development is generally stronger in high-income economies than in low-income economies. Recent empirical evidences, such as Arcand, et al. (2015), highlighted a nonlinear relationship, as too much finance can be detrimental to growth when an economy has attained a high level of financial development and goes beyond a certain threshold. In



the same vein, Beck (2013) introduced the financial possibility frontier, which shows the conditions for sustainable financial sector deepening. This implies definition of the maximum sustainable financial depth, breadth and outreach, which can be achieved and maintained without fragility risks (Beck, 2013).

Regarding the literature strand supporting the role of finance in economic growth, Schumpeter (1912) argued that development of the financial sector is essential for economic growth. His argument is that financial development affects economic growth by providing sufficient fund to the firms that have a best productive use. Later on, Goldsmith (1970), McKinnon (1973) and Shaw (1973) supported this view, indicating that the financial sector plays a major role in economic growth by making available an efficient credit line, better risk management processes, and minimizing adverse selection and moral hazards by reducing information asymmetries. According to Hicks (1969), development in the financial system played a critical role in industrializing England through the facilitation of capital mobilization. Other important research findings supported this, and argued that financial development is indispensable for economic growth (King & Levine, 1993; Levine, 1997; Jin Zhang, 2012; Ngongang, 2015; Bist, 2018).

Empirical evidences supporting positive impact of finance on growth or at least a bi-directional causality, are from both cross countries studies and individual country studies. A number of financial development measures were used, although the private sector credit to GDP was recurrent across all studies. Besides, endogeneity issues were taken care of in order to better gauge the effect of finance on growth.

Starting with cross-country studies, Levine, et al. (2000) used Generalized Method of Moments (henceforth GMM) to address inverse causality issues, with a sample of 74 developed and developing countries and data over the period of 1960-1995. Their results confirmed the existence of a favorable link between the exogenous component of the financial development and the economic growth, however, this positive relationship goes through the increase of global productivity of factors rather than over the volume of savings and the accumulation of capital.

In the same vein, Beck and Levine (2004), went further and included the stock market in their study. Findings from GMM estimation on dynamic panel data of 40 countries, revealed that the level of banking development (measured by the ratio of credits in



the private with regards to GDP) and the level of the stock markets' development (measured by the turnover ratio) each one exerts in an independent way a favorable effect on the economic growth.

Pradhan, et al. (2017), also used different proxies of financial development (banking sector development, bond market development, stock market development, and insurance sector development) to examine the finance-growth relationships in ASEAN region for the period of 1991– 2011. Findings show that banking sector development, stock market development, bond market development, insurance market development, and per capita economic growth shared a cointegrating relationship in long-run. However, in the case of causality, their results are sensitive to the use of financial development proxy. They accounted a unidirectional causality from banking sector development to economic growth and a bi-directional causality between stock market development and economic growth, and insurance sector development and economic growth.

About developing markets, Hassan, et al. (2011) found strong long-run linkages between financial development and economic growth on a sample including developed, emerging and developing countries using various methods ranging from panel analysis, VAR and Granger Causality. This study used a wide range of financial development indicators including credit to GDP ratio, banking sector to GDP ratio among others. However, for the short run, results rather suggested a one-way causality from growth to finance especially in case of Sub Saharan Africa.

Regarding country case studies, specifically on Africa, Jedidia, et al. (2014) selected a number of financial development indicators including private sector credit, value traded on financial market and issuing bank's securities on the financial market. Findings indicated that domestic credit to private sector has a positive effect on the economic growth. Moreover, this study confirms the view of bi-directional relationship between credit and economic growth. However, contrary to other studies such as Beck and Levine (2004), neither stock market development nor the intervention of banks in the stock market had robust and positive effects on the economic growth.

Considering another strand of literature, the neoclassical theorists argued that finance is not a primary source of growth. According to Lucas (1988) and Stern



(1989), the relationship between financial development and economic growth has long been overstressed in the literature. In line with this, Singh (1997), Andersen and Tarp (2003), Ayadi, et al. (2015), and Ductor and Grechyna (2015) provided some arguments and evidence for an inverse relationship between financial sector development and the economic growth. Here the idea is that, any strategies aimed at promoting financial system development would be a waste of resources, as it diverts attention from more relevant policies such as labour and productivity improvement programs, implementation of pro-investment tax reforms, encouragement of exports; amongst others.

Some empirical studies such as one by Menyah, et al. (2015) seemed to corroborate this. The latter examined the causal relationship between financial development and economic growth for 21 African countries within a framework that also accounts for international trade. Findings show limited support for the finance-led growth and the trade-led growth hypotheses, implying that recent attempts at financial development and trade liberalization do not seem to have made a significant impact on growth.

There is another pool of studies that have found either negative or no relationship between financial development and economic growth. (Singh,1997; Narayan & Narayan, 2013) in developing countries, Ayadi et al. (2015) in northern and southern Mediterranean countries, Ductor and Grechyna (2015) in 101 developed and developing countries, Grassa and Gazdar (2014) in five GCC countries, and Mhadhbi (2014) in the case of developed countries have found weak relationship between financial development and economic growth. Furthermore, some empirical evidences from Yıldırım, et al. (2013), Mobolaji & Oluitan (2013), Islam, et al. (2004), Kar and Pentecost (2000) indicated a unidirectional causality from economic growth to financial development in some countries.

On the other side, a number of empirical studies have suggested that financial system development can be detrimental to growth (Wijnberg 1983; Buffie 1984). Development in financial system facilitates risk amelioration and efficient resource allocation; this may reduce the rate of savings and risk, consequently leading to lower economic growth (Levine, 2005). However, this follows the basic assertion that, where there is high risk there is high return. Soltani, et al. (2014) findings suggested that financial development is detrimental to economic growth in this region. In the same vein, Adu, et al. (2013) for the case of Ghana, used three measures of financial



development including domestic credit as a share of GDP; domestic credit to private sector as a share of GDP and broad money supply as a share of GDP and pointed out that financial development undermines economic growth, and therefore cautions against financial liberalization in Ghana.

As previously discussed, some recent studies have raised the issue of threshold or non-linearity on the finance-growth nexus, arguing that the level of financial development is beneficial for economic growth up to a certain threshold. Once the development of financial sector reaches that threshold, further development of finance leads to declining economic growth. Law and Singh (2014) using the data of 87 developed and developing countries concluded that more finance is not necessarily good for economic growth. A more recent study by Demetriades et al. (2017) on the non-monotonic relationship between financial development and economic growth concluded that financial depth is no longer a significant determinant of long-run growth. Nevertheless, Deidda and Fattouh (2002) using threshold regressions model found that financial development has a more significant effect on economic growth in high-income countries in comparison with low-income countries.

According to Arcand et al. (2015), finance starts having a negative effect on output growth when credit to the private sector reaches a threshold. Arcand, et al. (2015) findings suggested a threshold when credit to the private sector reaches 80–100% of GDP.

In summary, looking at results from empirical studies especially in case of developing countries, the consensus on finance and growth relationship is yet to be reached. However, the fact that studies used different methods and different measures of financial development and different sample period can be one of the reasons behind diverging conclusion. For the case of Rwanda, a recent study by Karangwa and Gichondo (2016) assessed the linkages between sectoral credit and sectoral growth. Results from cointegration and VAR estimated for agriculture, industry and services sectors, suggested that in Rwanda, credit is more demand driven. The present study also reexamine this sectoral relationship in addition to the overall relationship between financial development and growth.



4. Methodology

The main objective of this study is to assess linkages between financial development and economic growth in Rwanda. In addition, this study assesses evolution of financial sector in Rwanda, by looking at different aspects related to financial institutions behavior, market structure and financial sector soundness. Regarding financial institutions, this study focuses mostly on banking sector as the main conduit to financing the economy, although the insurance sector also plays a role in managing risk in the economy. Therefore, the methodology is subdivided in three sub parts.

First, this study evaluates the behavior of banking sector and microfinance sector in Rwanda in line with Cihák and Podpiera (2005). The analysis is mostly descriptive and focus on balance sheets structure, efficiency, loans market, how financial institutions intermediation roles have been evolving.

The second part deepens analysis of banking market structure by assessing how competition has been evolving and its implications on the soundness of the banking system in Rwanda notably on banks solvency, banks liquidity and credit risks.

The third part is on finance and growth nexus. On this, this study attempts to evaluate the effect of financial sector development on output growth in Rwanda and vice versa, and goes deeper to assess the finance and growth linkages per economic sectors namely agriculture, industry and services.

4.1. Competition on banks market

Proponents of competition on banking market have underlined a number of benefits including consumer welfare, efficiency of financial services production, innovation, quality and diversity of products available for customers; hence better financial intermediation (Claessens & Laeven, 2003). However, despite gains, which may arise from a more competitive banking market, the relationship between competition and stability of the banking system has been subject to debate in both theoretical and empirical studies. On one side, competition stability hypothesis suggests that competition in the banking sector would contribute to its stability and this would enhance financial intermediation. On the other side, financial intermediation can be

hampered when more competition lead to more vulnerabilities in the banking sector in line with competition fragility hypothesis.

To assess how competition has been evolving on Rwandan bank market, this study follows the standard methodology used in various studies such as Almarzoqi, et al. (2015) and Leon (2014) by estimating the Lerner index.

Lerner index helps to measure whether and how banks are able to set price above the marginal cost. In a perfect competition, price and marginal cost should be equal and there will be a markup in a less competitive sector (Leon, 2014).

$$\text{Lerner}_{it} = \frac{(P_{it} - MC_{it})}{P_{it}} \quad (1)$$

Where i denotes bank i , and t denotes period of time t . P_{it} stands for price and is derived as the ratio of total income to total assets for bank i at time t , and MC_{it} is the marginal cost for bank i at time t .

Most of studies on bank competition suggest estimating a translog cost function for the banking system and use it to estimate the marginal cost. In the following translog cost function, bank output is proxied by total assets while banks inputs are and labor, deposits and physical capital (Leon, 2014). The translog function is specified as follows:

$$\begin{aligned} \text{LnCost}_{it} = & \beta_0 + \beta_1 \ln Q_{it} + \frac{\beta_2}{2} \ln Q_{it}^2 + \sum_{k=1}^3 \gamma_{kt} \ln W_{k,it} + \sum_{k=1}^3 \phi_k \ln Q_{it} \ln W_{k,it} \\ & + \sum_{k=1}^3 \sum_{j=1}^3 \ln W_{k,it} \ln W_{j,it} + \varepsilon_{it} \end{aligned} \quad (2)$$

Where Cost_{it} stands for total is cost for bank i at time t , and is the sum of interest expenses on deposits, other interest expenses, provision for bad debts, salaries, wages and staff costs, premises, depreciation and transport expenses and other expenses;

Q_{it} , is total assets and is a proxy for the bank output;

$W_{k,it}$ is the price of a bank's three main inputs(labor, funds and fixed capital). Following Sanya and Gaertner (2012) and Almarzoqi, et al. (2015), these input prices are derived as the ratios of personnel expenses to total assets, interest expenses to

total deposits, and other operating and administrative expenses to total asset respectively.

Equation 2 is specified as panel and estimated using banks fixed effects. Results from equation 2 above are used to calculate the marginal cost per bank following equation 3.

$$MC_{it} = \frac{cost_{it}}{Q_{it}} \left[\beta_1 + \beta_2 \ln Q_{it} + \sum_{k=1}^3 \phi_k \ln W_{k,it} \right] \quad (3)$$

4.2. Bank competition and soundness

This study improves on the previous study by Karangwa and Nyalihama (2018) and considers multiple dimensions of financial stability by evaluating the effect of bank competition on various bank soundness indicators namely bank solvency, liquidity and credit risks.

Bank solvency is proxied by Z index, which is an inverse proxy for the firm's probability of failure. According to Boyd et al. (2006), "Z-index represents the number of standard deviations below the mean by which profits would have to fall so as to just deplete equity capital". Hence, it is obtained using measures of banks profitability (return on assets), bank capitalization (equity to assets ratio) and a simple measure of volatility of banks returns (standard deviation of return on assets) as follows:

$$Z_i = \frac{ROA_i + E/TA_i}{\sigma_{ROA_i}} \quad (4)$$

Where ROA_i is the period average return on assets for bank i. It is calculated by dividing net profit after tax by average value of total assets.

E/TA_i is the period equity to total assets ratio for bank i. It is derived by dividing the period total shareholders' funds (paid up capital, share premium, total reserves) by period banks' total assets.

σ_{ROA_i} is the standard deviation of return on assets and a proxy of volatility in banks' returns.

Important to note that increase in Z index implies improvement in banks solvency.

Regarding liquidity, this is usually measure as the ratio of banks liquid assets to its liquid liabilities. For this study, liquidity is proxied by bank liquid assets to total deposits.

Credit risks is proxied by the non-performing loans ratio (NPL).

In line with other studies such as Almarzoqi et al. (2015), the following models evaluate the effect of banks competition on the above-mentioned measures of solvency, liquidity and credit risks respectively:

$$Z\ index_{it} = \alpha_0 + \alpha_1 Lerner_{it} + \sum_{j=3}^n \alpha_j \text{Bank specific}_{j\ it} + \sum_{j=n}^m \alpha_j \text{macro indicator}_{j\ it} + \varepsilon_{it} \quad (5)$$

$$Liquidity_{it} = \alpha_0 + \alpha_1 Lerner_{it} + \sum_{j=3}^n \alpha_j \text{Bank specific}_{j\ it} + \sum_{j=n}^m \alpha_j \text{macro indicator}_{j\ it} + \varepsilon_{it} \quad (6)$$

$$NPL_{it} = \alpha_0 + \alpha_1 Lerner_{it} + \sum_{j=3}^n \alpha_j \text{Bank specific}_{j\ it} + \sum_{j=n}^m \alpha_j \text{macro indicator}_{j\ it} + \varepsilon_{it} \quad (7)$$

Banks specific indicators selected include size and efficiency. The size is proxied by the total assets of each bank in natural logarithm while efficiency is proxied by the ratio of non-interest operating costs (sum of labor expenses and other expenses) over total income.

Macroeconomic indicators are the real GDP growth and an indicator of regulatory environment namely the indicator of strength of legal rights.

Other empirical studies considered data on supervision strength, activities restrictions and banking freedom. These were not available in long series for Rwanda. The indicator of strength of legal rights was the only one available.

All commercial banks operating in Rwanda at the beginning of the sample period (2006) were included (six commercial banks representing 70% of the total assets of commercial banking system). The sample period is from 2006 to 2018 and data are annual.

The above equations are estimated using panel fixed effects. This is because, our panel is composed by banks and each likely have its own characteristics. In case the



individual in the sample is one of kind and not a random draw, (Verbeek, 2004) propose to use fixed effect rather than random effects. In addition, in those models there are likely some bank specific variables omitted in the models, which, may be correlated with variables in the models and fixed effect, would control for that.

4.3. Finance and growth nexus

From the literature, multiple approaches were used to assess finance and growth nexus. Most of studies were cross-countries hence using panel estimation techniques. The present study is a one-country case and follows the methodology used by Xu (2000), and Luintel and Khan (1999), who assessed finance and growth nexus on multiple countries looking at country-by-country cases and using multivariate VAR framework.

Key variables are an indicator of financial development and real GDP growth. On indicator of financial development, standard measures used in the literature include the ratio of private sector credit to GDP and broad money to GDP. Nevertheless, according to King and Levine (1993), the latter may not be closely related to financial services such as risk management and information processing. In addition, according to Luintel and Khan (1999) broad money to GDP ratio is rather a measure of monetization rather than financial depth and in case of developing countries, increase in monetization may occur without improvement in financial development. Therefore, in the present study, we follow Xu (2000) and Luintel and Khan (1999) and construct an indicator of financial development as the ratio of geometric mean of total banking sector deposits in current and previous period on nominal GDP. Other variable included in the model are real GDP, real investment and repo interest rate.

Real GDP is naturally included as a measure of economic growth. As the literature postulates that financial sector boosts economic growth through provision of long-term funds for investment. Real investment is also included in the model. Lastly, repo interest rate is included as a proxy of the level of interest rate in the economy, which according to the literature is crucial for saving mobilization and financial sector development.

The sample period is from 2006 to 2018 with quarterly observations. Before proceeding with model estimation for time series, unit root test were conducted on each series and due to the presence of non-stationary series, the study uses Johansen test for cointegration.

Regarding the ordering of variables, indicator of financial development is ordered first similar to Xu (2000), Luintel and Khan (1999). The model estimated in line with Johansen approach is as follows:

$$\Delta X_t = \mu + \sigma_1 \Delta X_{t-1} + \dots + \sigma_{p-1} X_{t-p+1} + \pi X_{t-p} + u_t \quad (8)$$

Where X is a vector of non-stationary endogenous variables, namely indicator of financial development, real GDP, real investment and repo interest rate. We do not impose theoretical parametric restriction on absence of effect of capital stock on financial development.

Results from VECM especially on coefficient of adjustments allows to test for weak exogeneity of variables included in the model and help to answer the question whether in Rwanda, the link between financial sector development and economic growth is one way from financial sector development to economic growth or vice versa or both ways.

Given that ordering of variables in VAR may have an effect on results, this study also estimate the model with an alternative order starting with real GDP followed by indicator of financial development, real investment and repo interest rate.

This study also look at Granger causality in order to assess whether financial sector development can help to predict real GDP growth in short run and vice versa.

Regarding the sectoral analysis, the same approach is followed. However, contrary to Karangwa and Gichondo (2016) study, the models also include repo interest rate in addition to GDP per sector and credit per each sector respectively.

5. Empirical results

Before assessing finance and growth nexus in Rwanda, this study analyses evolution of financial institutions in Rwanda. First, some aspects describing behavior of



financial institutions are considered to highlight development observed in the last two decades. Secondly, the study considers banks competition evolution and its implications on multidimensional aspects of financial stability. Lastly, finance and growth nexus is empirically tested.

5.1. Banks and microfinance behavior in Rwanda

Banking sector in Rwanda has recorded tremendous progress in recent years as it grew in size and new banks entered the market including subsidiaries of foreign banks. This study mostly follows the methodology used by Podpiera and Čihák (2005) when they assessed banking sector in three EAC countries namely Kenya, Tanzania and Uganda.

5.1.1. Banking sector balance sheet structure

Banks in Rwanda lend mostly to the private sector and this is across largest banks, other remaining banks and subsidiaries of foreign banks. The share of loans to private sector in total assets was at 57.5 percent, by December 2018 and lending activities is the main source of income in Rwandan banking sector. However, looking at banks categories, by end 2018, the share of government and other debt securities in total assets was higher in subsidiaries of foreign banks (16.7 percent) than in local banks (12.4). Obviously, subsidiary of foreign banks tend to hold more liquid assets compared to local banks.

Table 1: Structure of assets in commercial banks (as percentage of total assets)

	All banks		Largest banks		Other banks (Incl. subsidiaries of foreign banks)		Subsidiaries of foreign banks	
	2017	2018	2017	2018	2017	2018	2017	2018
Cash and reserves	7.7	8.0	7.6	8.0	7.7	8.1	9.7	9.6
Balances w/ bank	12.1	14.9	8.8	10.7	15.1	18.5	13.3	16.2
Loans & advances	59.2	57.5	62.8	63.0	56.0	52.7	55.0	51.1
Government and other securities	14.5	13.4	14.2	12.4	14.7	14.3	15.7	16.7
other assets	6.5	6.2	6.5	5.8	6.5	6.4	6.4	6.4

Source: Authors' calculations



About liquidity, banking system in Rwanda has been well liquid as indicated by various liquidity indicators such as short-term gap (measure that contrasts short-term assets and short-term liabilities) and the ratio of liquid assets to total deposits.

Regarding the loans to deposits ratio, the situation is different for the category of largest banks, which have recently been more active in investing in less liquid assets (especially loans) compared to subsidiaries of foreign banks as displayed in table 2. The loans to assets ratio of largest banks reached 101.9 percent by end 2018 and subsequently, the share of cash, reserves and balance with banks in total assets is lower compared to other banks. Obviously, the subsidiaries of foreign banks and small banks in Rwanda tend to be cautious and their preference for liquid and low risk assets is relatively higher compared to the largest banks.

In microfinance institutions (MFIs), loans to deposits ratio has consistently been higher compared to banks suggesting a relatively less comfortable liquidity position. This is also because loans are the main earning assets of MFIs as discussed in the next sections.

Table 2: Loans to deposits ratio in Rwanda (in percentage)

	All banks	Largest banks	Other banks (Incl. subsidiaries of foreign banks)	Subsidiaries of foreign banks	MFIs
2015	86.6	82.0	89.5	76.7	95.3
2016	91.7	92.4	91.0	80.2	112.2
2017	92.2	97.5	87.5	79.8	106.4
2018	90.5	101.9	81.0	74.1	109.7

Source: Authors' calculations

Regarding microfinance sector, the main difference compared to commercial banks is on the share of most liquid assets notably cash held in other banks which is significantly higher and lower investment in government securities compared to banks

Table 3: Structure of assets in Microfinance institutions (as percentage of total assets)

	2008	2010	2012	2014	2016	2018
Cash in Vaults	2.05	3.72	2.08	1.58	1.24	1.51
Cash in Banks	14.82	17.07	28.91	33.06	30.28	30.98
Treasury Bills& Placements	5.22	1.29	0.10	0.09	0.46	1.18
Loan Portfolio (Net of Provisions)	68.61	70.06	55.94	54.51	57.64	56.69
Other Assets	9.31	7.86	11.19	10.77	10.38	9.64

Source: Authors' calculations

The share of deposits in foreign currency has recently increased. This trend may reflect ongoing dynamics in external transactions in Rwanda especially a boom in non-traditional exports in 2017 and 2018. Besides, the depreciation of FRW against USD has been low; hence, this change in deposits in foreign currency cannot be seen as a flight to safety. Regarding foreign currency deposits by type of banks, the share of deposits in foreign currency in total deposits par bank is slightly higher in subsidiaries of foreign banks than in local banks.

The share of loans in foreign currency in total loans has slightly gone up in last two years compared to the previous years, reaching 12.7 percent in 2018. The situation is almost the same across local banks and subsidiaries of foreign banks.

Even though, loans in foreign currency are generally priced at lower rates in Rwanda, higher share of loans in foreign currencies could increase borrowers exposures to FRW depreciation and negatively impacts their capacity of loan repayment especially when their earning in foreign currency are low or absent. On the other side, lending in foreign currency could mitigate banks' balance sheet exposure to FRW depreciation especially when banks have liabilities in foreign currency. Given that in recent years, FRW depreciation has been generally low and stable, except in 2017, and this trend is expected to continue in medium term, there should not be any adverse effect on Rwandan banking sector as long as these foreign operations remains within prudential measures set by NBR and there is no external shock.



Table 4: Deposits and loans in foreign currencies (percent)

	2012	2013	2014	2015	2016	2017	2018
Forex deposits/total	24.5	27.3	31.3	20.2	27.6	27.4	27.9
Forex loans/total loans	1.1	2.3	9.5	11.1	11.7	14.1	12.7

Source: authors' calculations

Regarding, the outstanding loans by sectors across banks by end 2018, mortgage industries and trade remained the most financed by banks in Rwanda while agriculture and mining are the least financed. This is the same pattern across East Africa region and one of the reasons behind is banks' risk aversion about agriculture and mining sectors while appropriate hedging instruments are not yet well developed.

There are some difference across banks categories notably on lending to manufacturing industry, trade, restaurant and hotels and mortgages. By end 2018, largest banks had lent more to hotels and restaurant industries compared to subsidiaries of foreign banks while the latter were more exposed on lending to other trade sectors and manufacturing compared to local banks.

About mortgage industries, local banks have been more active than subsidiaries of foreign banks. Obviously, the subsidiaries of foreign banks have been more cautious on less liquid and long term investment than local banks. This may be because some of these are new on the local market.

Looking at loans maturity by end 2018, the big chunk of outstanding loans are long-term loans with almost a half of total outstanding loans. Consistent with the structure of balance sheets previously presented, subsidiaries of foreign banks preferred more liquidity as shown by their high share of short and medium term loans (62.3 percent against 37.7 percent in long-term loans).

Table 5: Structure of lending by banks group (in 2018, percent share)

	All banks	Largest banks	Other banks (Incl. subsidiaries of foreign banks)	Subsidiaries of foreign banks
Personal loan	8.0	8.2	7.7	9.5
Agricultural, fisheries&	1.4	0.6	2.2	0.7
Mining activities	0.2	0.2	0.1	0.0
Manufacturing activities	10.1	9.2	11.0	14.5
Water & energy activities	2.9	4.2	1.6	1.5
Mortgage industries	36.7	34.3	39.3	35.0
Trade	17.2	18.7	15.5	18.7
Restaurant & hotel	7.2	6.1	8.4	4.4
Transport & warehousing	12.1	15.3	8.5	11.5
OFI & Insurance	1.2	1.4	0.9	0.5
Other services	3.2	1.8	4.8	3.6

Source: Authors' calculations

Similarly, in MFIs sector, constructions sector and trade, hotels and restaurants sectors are the main recipients of loans. Important to note is the higher share of loans to agriculture disbursed in MFIs compared to the share in commercial banks.

Table 6: Structure of lending by MFIs (percent share)

	2010	2012	2014	2016	2018
Agriculture, Livestock, Fishing	13.5	13.9	13.5	14.9	15.2
Public Works (Construction), Buildings	16.7	22.5	31.9	30.4	23.6
Commerce, Restaurants, Hotels	42.6	35.5	36.4	34.0	31.2
Transport, Warehouses, Communications	5.6	9.8	3.8	4.2	4.1
Others	21.5	18.4	14.4	16.5	25.9

Source: Authors' calculations

Table 7: Maturity of loans in 2018 (percent of total loans)

	All banks	Largest banks	Other banks (Incl. subsidiaries of foreign banks)	Subsidiaries of foreign banks
0 to 12 months	20.1	22.1	18.1	23.6
13 months to 60 months	30.5	30.8	30.2	38.7
Above 60 months	49.3	47.1	51.7	37.7
Total	100	100	100	100

Source: Authors' calculations



5.1.2. Intermediation role by banks in Rwanda

The cost of intermediation in Rwanda has remained relatively high as indicated by persistently high spread and net interest margin. However, this situation is not different from other sub-Saharan African countries whereas compared to emerging and developed countries, there is a lot to gain in matter of efficiency. In East African region, net interest margin in Rwanda was slightly lower than in Uganda and Tanzania in 2016 and almost at the same level as Kenya.

Table 8: Interest rates, spread and margins (percent)

	Real lending rate	Real deposit rate	Real spread	Net interest margin
2012	10.4	2.5	7.9	9.5
2013	13.1	5.7	7.4	9.7
2014	15.5	6.4	9.0	7.8
2015	14.8	5.7	9.1	8.8
2016	11.6	2.2	9.4	9.6
2017	12.3	2.8	9.5	8.9
Sep-18	15.3	6.0	9.4	9.2 (June)

Source: Authors' calculations

The next chart indicates that the spread between lending and deposit rate has consistently been high and above 9 percent for the last five years, despite some gains on banking markets competitiveness. One of the reasons is the downward rigidity of lending rates while deposit rates follow the stance of monetary policy and other money markets rates. Of recent, monetary policy stance has been accommodative and in some episodes, deposit rates would decline while lending rates remained relatively sticky.

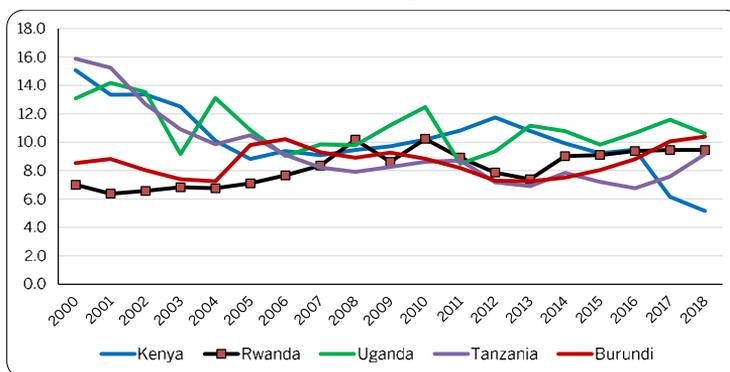
The rigidity of lending rates in Rwanda is because banks' operating costs have remained high overtime, though there have been some efficiency gains in recent years. In addition, other factors of lending rates rigidity in Rwanda include credit risks, market power in the loans market and to some extent by the cost of funds (Karangwa & Nyalihama, 2018).

Interest rates spread in Rwanda continued to be relatively rigid between 2016 and 2018 and stood at 9.1 percent on average in 2018. Compared to other East African countries, interest rate spread was slightly lower than in Uganda and Burundi, at the

same level with Tanzania and higher than in Kenya. The sharp fall of spread in Kenya followed the cap on lending rates.

Looking at some emerging and developed financial markets, the spread in EAC region is high and there is still a room to improve on efficiency. For instance, from 2006 to 2015 average interest rate spread averaged 3.5 percent in South Africa and 5.1 percent in Singapore, while it stood at 8.7 percent in Rwanda.

Figure 4: Interest rate spread in EAC region



Source: Authors' calculations

5.1.3. Explaining the interest rate spreads: accounting decomposition

Using accounting decomposition to assess the factors behind interest rates spread in Rwanda, spread are decomposed into four, namely interest paid to cover required reserves, loans loss provision, operating cost and pretax profit. In 2017, the profit margin accounted for half (4.7) of the whole spread (9.5) while operating cost accounted for a third (3.1). Details are in table 9.

While the share of interest paid to cover required reserves and loans loss provision has been almost steady (around 0.9 and 0.8 respectively), the share of pretax profit is gradually increasing at the expenses of share of operating cost, implying some improvements in banking sector efficiency as costs are progressively cut. Ongoing



increase in share of profit and a reduction in non-performing loans would reduce provision; give room to reduce the spread, without reducing banking sector profitability needed to increase the return on assets ratio.

Regarding the situation across categories of banks, pretax profit is higher in local banks than in subsidiaries of foreign banks. One of the reason is that some of these subsidiaries are new on the local market and their costs are still high. For well-established subsidiaries of foreign banks, the share of cost is low, NPLs ratio are low leading to lower provision and pretax profit margin are higher (5.3) than the overall level in the banking sector (4.7).

Table 9: Decomposition of interest rate spread overtime

	2012	2013	2014	2015	2016	2017	Average
Interest earned on loans and advances	16.7	17.3	17.3	17.3	17.3	17.2	17.2
Interest paid on customer deposits	8.8	9.9	8.2	8.2	7.9	7.7	8.5
Spread	7.9	7.4	9.0	9.1	9.4	9.5	8.7
Interest paid to cover required reserves	0.8	0.9	0.9	0.9	0.9	0.9	0.9
Loan loss provisions/loans	0.7	0.9	0.8	0.9	0.7	0.8	0.8
Operating costs/loans	4.1	4.2	3.7	3.3	3.2	3.1	3.6
Pre-tax profit	2.2	1.5	3.7	4.0	4.5	4.7	3.4
Return on assets (after tax)	2.3	1.9	2.0	2.3	1.9	1.7	2.0

Source: Authors' calculations

Table 10: Decomposition of interest rate spread in 2017

	All banks	Largest banks	All Subsidiaries of foreign banks	Well established Subsidiaries of foreign banks
Interest earned on loans and advances	17.2	17.0	18.9	16.6
Interest paid on customer deposits	7.7	6.9	6.8	6.5
Spread	9.5	10.1	12.1	10.1
Interest paid to cover required reserves	0.9	0.9	0.9	0.8
Loan loss provisions/loans	0.8	0.7	0.6	0.5
Operating costs/loans	3.1	2.8	6.2	3.4
Pre-tax profit	4.7	5.7	4.3	5.3
Return on assets (after tax)	1.7			

Source: Authors' calculations

About non-performing loans, largest banks are faring relatively better than other remaining banks and MFIs as shown in table 9. Overall, the situation have improved compared to 10 years although NPLs ratio is still above the benchmark of 5 percent.

Table 11: Non-performing loans ratio

	All banks	Largest banks	Other banks (Including subsidiaries of foreign banks)	Subsidiaries of foreign banks	MFIs
2012	5.3	5.5	4.8	5.3	8.5
2013	6.0	7.1	6.1	7.4	6.8
2014	5.1	5.4	6.2	6.8	7.0
2015	5.2	5.1	7.3	7.6	7.9
2016	5.7	6.8	7.8	6.8	9.0
2017	6.6	5.4	7.2	6.7	8.2

Source: Authors' calculations

Bank productivity is gradually improving as indicated by assets, loans and deposits per employee. Actually, productivity indicators compare banks income and size with the number of its employees and show how productive banks staff are and can suggest whether banks are overstaffed or not. Despite ongoing improvements, bank productivity in Rwanda in 2017 was below to the level of emerging market countries average back in 2004 where net interest per employee was 60 thousand US dollar and assets per employee at 2,040 thousands US dollar (Beck & Fuchs, 2004). The table below displays various measures of productivity in Rwandan banking system in 2017.

Table 12: Bank productivity in 2017 (Thousands USD)

	Net interest per employee	Assets per employee	Loans per employee	Deposits per employee
Rwanda	42.2	619.0	357.3	401.7

Source: Authors' calculations



5.1.4. Profit margin and market structure

Following the methodology used by Podpiera and Čihák (2005), we estimated interest rate spread equation using bank level quarterly data to investigate factors driving interest rate spread in Rwanda. We initially selected five explanatory variables namely operating cost per bank, bank size, share of loans in foreign currency in total loans, non-performing loans ratio and dummy variable of whether a bank is local or is a subsidiary of foreign bank. However, we did not do a cross-country comparison by including country dummies as in the case of Podpiera and Čihák (2005).

Ownership dummy and non-performing loans ratio were not significant and removed from the equation. The results below however show that the equation explains around 15 percent of spread variability.

Findings indicates that operating costs significantly affect interest rate spread in Rwanda while the effect of lending in foreign currency is minimal. This may be due to the fact that the share of lending in foreign currency is still low. In addition, increase in bank size leads to a reduction in the spread, suggesting that as banks grow, there would be more efficiency. Previous studies such as Kigabo, et al. (2016) and Karangwa and Nyalihama (2018) highlighted that costs are the main driver of spread in Rwanda. Other factors were market share and credit risks.

Besides, whether a bank is local or a subsidiary of foreign bank does not significantly affect the spread. However, these results should be taken cautiously because our sample did not include all banks. Some of new foreign subsidiaries were not included due to data availability in years prior to their arrival.

Table 13: Spread equation results

Dependent Variable: SPREAD				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Operating cost	2.46	0.95	2.58	0.01
Size	-1.46	0.79	-1.84	0.07
Share of loans in FX	0.06	0.03	2.26	0.03
C	5.93	3.26	1.82	0.07
R-squared	0.14			
Adjusted R-squared	0.12			
F-statistic	6.61			
Prob(F-statistic)	0.00			

Source: Authors' calculations

Overall, findings suggest that there is still a room to improve efficiency in Rwandan banking sector. Largest banks in Rwanda are relatively more efficient compared to other banks, as they can take advantages of economies of scale. In addition, largest banks in Rwanda are the most likely to finance bigger and long term project, which in most of the cases have relatively lower lending rates as borrowers are usually big companies with well-established reputation and perceived as less risky.

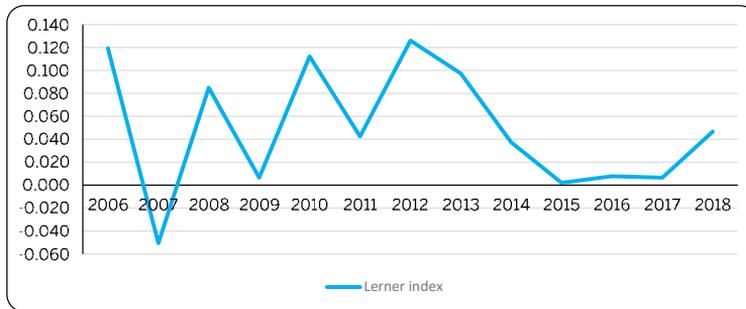
Regarding the impact of subsidiaries of foreign banks on efficiency or intermediation in Rwanda, it is hard to draw a conclusion because most of them are new on the markets and some others have acquired some old banks, which were well established in Rwanda before that acquisition. However, there are some few features worthy to mention. One is that subsidiaries of foreign banks tend to invest in more liquid assets than local banks. Some researchers have argued that foreign owned banks are more eager to finance large multinational firms than local firm and also their lending tend to be short term (Cihák & Podpiera, 2005). This liquidity preference is also evident for foreign banks in Rwanda.

5.2. Bank competition and banks soundness in Rwanda

In order to assess the effect of competition on banks soundness in Rwanda, the translog cost function (model 2) was estimated in the first step, using bank fixed effects and coefficients were used to calculate the marginal cost. Even though some coefficients were not statistically significant, overall diagnostic tests for model 2 were

satisfactory. The marginal cost per bank from equation 3 was used to derive the Lerner index per bank in line with the equation 1. The next chart displays the evolution of average Lerner index since 2006 and depicts an ongoing improvement in competition on banking market in Rwanda since 2012. Lower Lerner index implies less market power to price above the marginal cost, hence more competition.

Figure 5: Evolution of Lerner index

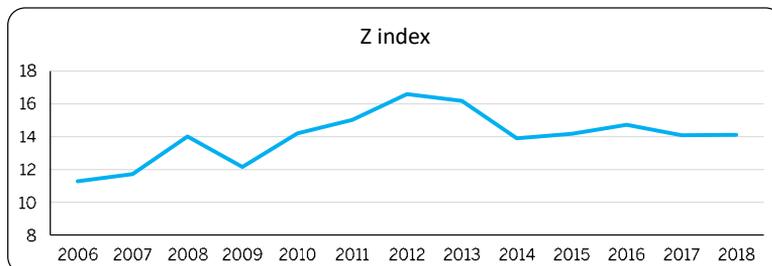


Source: Authors' calculations

Previously, Kigabo and Nyalihamu (2015) had also found an improvement in competition in banking sector in Rwanda. However, there are some differences in the level of index, given that the new sample period includes observations for 5 more years. Estimation of banks translog cost function with a larger sample period led to some adjustments on banks marginal cost and subsequently on the level of Lerner index level prior to 2014, previously estimated by (Kigabo & Nyalihamu, 2015).

In addition, the indicator of bank solvency namely Z-index was calculated in line with equation 4. Figure 6 shows an increase in Z index, indicating an improvement of solvency of banking sector in Rwanda compared to 2006, though since 2014, the situation has not changed much. In general, bank solvency is adequate and despite some differences across banks, all banks included in the sample have a significantly large Z-index, despite relatively lower profitability compared for example to Kenyan banking system. Higher capitalization and less volatile return on assets in Rwandan banking sector has contributed to safeguard and enhance the solvency level in Rwandan banking sector.

Figure 6: Evolution of Z index



Source: Authors' calculations

About the effect of price competition banks solvency, equation 5 was estimated with bank specific fixed effects. Diagnostic test are generally satisfactory as residuals were normal with an adjusted R squared of 0.81. Diagnostic tests results are in the annex.

Findings in table 14 suggest that bank market power positively affects bank solvency. These results are partly in line with the ones previously found by Kigabo and Nyalihama (2015) for the case of Rwanda. Similarly, Almarzoqi, et al. (2015) for the case of MENA countries also observed that, a decrease in price competition improves the bank solvency.

While competition is often hailed as important to improve efficiency and deepen the market, there may be some nuances regarding banking sector in developing markets like Rwanda, where banks still face relatively high costs and some are new and not yet larger enough to have economies of scale. In such a case, fierce competition may lead to underpricing and race to the bottom.

Therefore, if banks have some latitude to price above the marginal cost, this will improve the profitability and capitalization, hence solvency. In addition, with high operating costs and lending rates downward rigidity in Rwandan banking sector, these results underline how important banking sector efficiency is, in reducing banks cost and allow banks to eventually adjust their lending rates in line with monetary policy, without jeopardizing their solvency.

Other key variables are bank efficiency and legal rights, which have a positive effect on bank solvency as expected. The effect of bank size and GDP growth are not statistically different from zero.

Table 14: results for bank solvency equation

Dependent Variable: Z_SCORE				
Method: Panel EGLS (Cross-section weights)				
Variable	Coefficien t	Std. Error	t-Statistic	Prob.
Lerner	7.39	1.55	4.76	0.00
Efficiency	9.18	3.73	2.46	0.02
Legal rights	0.45	0.14	3.30	0.00
GDP growth	0.02	0.19	0.09	0.93
Size	-0.06	1.23	-0.05	0.96
c	6.87	6.00	1.14	0.26

Source: Authors' calculations

Regarding the effect of bank price competition on banks liquidity, equation 6 was also estimated with bank specific fixed effects. On diagnostic test, residuals were normal with an adjusted R squared of 0.41.

Estimation in table 15 suggests that bank competition positively affects bank liquidity in Rwanda, almost similar to the case of MENA countries where a decrease in the Lerner index, that is an increase in price competition implies an improvement in the liquidity ratio.

About other key variables, increase in bank efficiency improves bank liquidity while improvement of legal rights and GDP growth has negative impact on bank liquidity although it is obviously minor.

Table 15: results for bank solvency equation

Dependent Variable: LIQUIDITY					
Method: Panel EGLS (Cross-section weights)					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
Lerner	-0.32	0.14	-2.29	0.03	
Efficiency	0.52	0.18	2.94	0.00	
Size	-0.01	0.05	-0.20	0.85	
Legal rights	-0.02	0.01	-2.82	0.01	
GDP growth	-0.02	0.01	-2.84	0.01	
C	0.73	0.28	2.60	0.01	

Source: Authors' calculations

On the effect of bank price competition on credit risk, equation 7 was estimated with bank specific fixed effects. Diagnostic tests on normality and correlation were however not satisfactory but the adjusted R squared is around 0.60.

Findings indicate that bank competition would lead to increase in credit risks proxied here by NPLs ratio. Results by Almarzoqi, et al. (2015) for the case of MENA were also in the same line. They suggested that banks with large market power display a lower NPLs ratio, because they are profitable, hence less interested in taking additional risks.

In addition, more competition on the market can lead to a race to the bottom when banks underprice their products and services to win customers. In such a case, even unviable project can be financed and lead to higher non-performing loans.

Jiménez, et al. (2013) underlined the hypothesis where more competition can erode the franchise value of a bank and give incentives to shift its policies and start financing riskier projects in order to safeguard its profitability, and this move would likely lead to higher non-performing loans.

The effects from other variables included in the model were not statistically different from zero except legal rights. Improvement in the later lead to a decline in NPLs ratio as expected.

Table 16: results for bank solvency equation

Dependent Variable: NPL				
Method: Panel EGLS (Cross-section weights)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Lerner	-0.17	0.06	-2.69	0.01
Efficiency	0.07	0.08	0.77	0.44
Size	0.00	0.02	0.17	0.86
GDP growth	0.00	0.00	-0.79	0.43
Legal rights	-0.02	0.00	-6.08	0.00
c	0.23	0.11	2.03	0.05

Source: Authors' calculations

Overall, findings tend to suggest that in Rwanda, lower price competition on the banking market would have positive effect on some dimensions of financial stability notably banks solvency and the credit risk of the banks' asset portfolio.



However, more price competition is positively affecting banks liquidity, which is also a key indicator of financial soundness. On this, it is likely that competition may increase banks' risk aversion and elicit more preference for liquid assets.

5.3. Finance and growth nexus

Regarding finance and growth nexus in Rwanda, this study borrows from King and Levine (1993), Xu (2000) and especially Luintel and Khan (1999).

Variables considered in empirical model are the indicator of financial development and economic development namely real GDP, real investment and interest rate (repo rate).

Following Xu (2000) the indicator of financial development is derived as the geometric mean of total banking sector deposits in current quarter and previous quarter divided by nominal GDP in the current quarter.

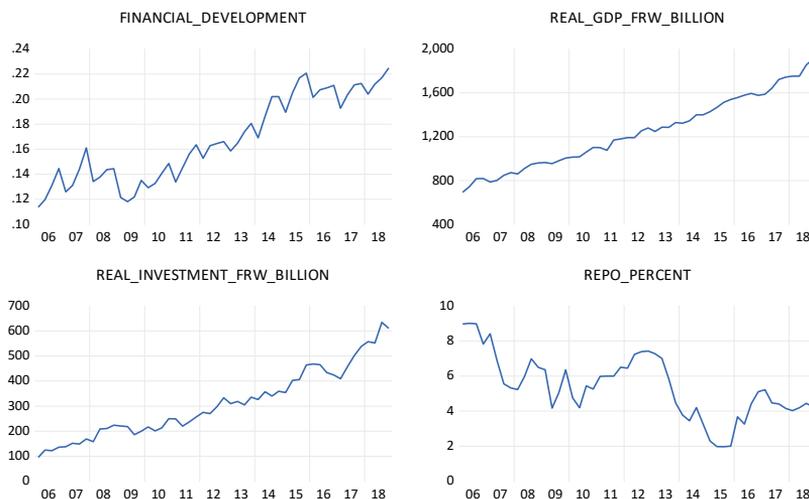
Real GDP is the indicator of economic growth in Rwanda and is included in the model in logarithm.

Real investment is obtained from the national account statistics and is one of GDP components. Luintel and Khan (1999) suggested that in line with McKinnon and Shaw models, financial intermediation affects growth via promotion of investment; and included real per capital stock in their model. The present study includes real investment as a proxy of capital accumulation. Nevertheless, it is included as a flow variable.

The repo rate is included as a measure of interest rate in the economy, which according to the literature is crucial for savings mobilization and financial sector development.

The chart below displays historical developments of main variables used in this study. The economic expansion has been sustainable overtime along with the capital formation and the level of financial development. The trend in repo rate has been downward along with financial sector expansion and financial deepening.

Figure 7: Evolution of key variables



Source: Authors' calculations

The correlation matrix below, confirms the co-movement, which has characterized financial development in Rwanda with economic expansion and capital formation. Correlation coefficients between the three variables are above 0.90, which signals a strong positive co-movement.

Table 17: Correlation analysis

	Index of financial development	Real GDP (FRW billion)	Real investment (FRW billion)	Repo rate (percent)
Index of financial	1.000	0.938	0.920	-0.681
Real GDP (FRW billion)	0.938	1.000	0.985	-0.652
Real investment (FRW)	0.920	0.985	1.000	-0.638
Repo rate (percent)	-0.681	-0.652	-0.638	1.000

Source: Authors' calculations

For all variables (except those in logarithm), the mean is higher than the median, implying a rapid expansion in the real economy and in the financial development in recent years. Secondly, standard deviations are very low suggesting a lower volatility except for investment, which has shown some degree of volatility overtime.

Table 18: Descriptive statistics

	Index of financial development	Real GDP (FRW billion)	Real investment (FRW billion)	Repo rate (percent)	Real GDP (in log)	Real investment (in log)
Mean	0.17	1239	308.9	5.37	7.08	5.63
Median	0.16	1220	286.5	5.24	7.10	5.65
Maximum	0.22	1909	634	9	7.55	6.45
Minimum	0.11	693	96	1.97	6.54	4.56
Std. Dev.	0.03	325.6	137.2	1.78	0.26	0.46
Observations	52	52	52	52	52	52

Source: Authors' calculations

As required for time series analysis, we tested for the presence of unit roots and results from Augmented Dickey Fuller (henceforth ADF) tests suggested that all variables were non-stationary in their level.

Table 19: ADF Unit root tests results

	ADF probability (Variables in level)	ADF probability (Variable in first difference)	Conclusion
Index of financial development	0.934	0.083	I(1)
Real GDP in log	0.859	0.000	I(1)
Real investment in log	0.439	0.000	I(1)
Repo rate	0.189	0.000	I(1)

Source: Authors' calculations

Therefore, we proceed with Johansen cointegration analysis to evaluate whether there is a long run relationship between financial development and economic growth or not. Thereafter, we examined whether in Rwanda, causality runs from financial development to economic growth or vice versa or whether there is a two-way causality.

Some simple preliminary analysis such as Granger causality tests revealed a two-way causality in Granger sense, between financial development and real GDP, implying that in short run, change in level of financial development would help to predict



change in real GDP and vice versa. Besides, change in real investment can help to predict change in financial development but will not help to predict change in real GDP, whereas change in real GDP can help to predict change in real investment. Lastly, change in level of financial development does not help to predict change in investment in the short run. Table 20 displays the results from Granger causality test.

Table 20: Granger causality test

VAR Granger Causality/Block Exogeneity Wald Tests			
Sample: 2006Q1 2018Q4			
Included observations: 49			
Dependent variable: Index of financial development			
	Chi-sq	df	Prob.
Real GDP in log	48.74	3.00	0.00
Real Investment in log	42.31	3.00	0.00
All	66.36	6.00	0.00
Dependent variable: Real GDP in log			
	Chi-sq	df	Prob.
Index of financial development	10.718	3.000	0.013
Real Investment in log	5.787	3.000	0.123
All	12.927	6.000	0.044
Dependent variable: Real investment in log			
	Chi-sq	df	Prob.
Index of financial development	2.549	3.000	0.467
Real GDP in log	8.634	3.000	0.035
All	15.670	6.000	0.016

Source: Authors' calculations

Nevertheless, Granger causality results are not enough for empirical test for finance and growth nexus. A multivariate VAR framework may be rather appropriate as it helps to avoid endogeneity issues, which are common in macro analysis.

Stationarity tests in previous sections indicated that all variables are integrated by order one. Therefore, we use Johansen framework to assess long run relationship between financial development and economic growth.

First, the trace statistic suggests that our model has at most one cointegrating vector while the maximum eigenvalue statistics suggests two cointegrating vectors. We consider the trace statistics as it is more robust in testing cointegration under the Johansen approach.

These results suggest a long run relationship between financial development and economic growth in Rwanda, well in line with economic theory and empirical literature on finance and growth relationship.

Cointegrating vector in table 21 suggests that in the long run, financial development is positively affected by real GDP. Nevertheless, the coefficients on investment is negative contrary to what was expected. This is puzzling considering that more capital should normally lead to financial development. However, the fact that investment include also public investment, which can be volatile in developing countries, may also disrupt this relationship.

Repo rate coefficient is very low and not statistically different from zero.

The next table displays the long run cointegration equation results. Here it is important to recall that real GDP and real investment are in logarithms implying that the coefficients are semi elasticities.

Table 21: Johansen cointegration equation

Dependent variables : Financial development indicator			
	Coefficients	St. errors	T statistics
Log of real GDP	2.09	-0.30	-6.9
Log of real investment	-1.19	-0.19	6.4
Repo rate	-0.01	-0.01	1.5

Source: Authors' calculations

As a long run relationship between financial development and economic growth is evidenced by cointegration results, long run causality test were conducted using test for weak exogeneity for variables of interest namely index of financial development and real GDP. According to Luintel and Khan (1999), once a system is cointegrated, weak exogeneity system is equivalent to the notion of long-run causality. This involves a test for zero restriction on coefficient of adjustment in estimated VECM. If the null hypothesis that coefficient is equal to 0 is not rejected, the variable is weakly exogenous and hence there is no causality in the long run.

From results in table 22, the null hypothesis of weak exogeneity is rejected, implying a two-way causality in the long run. That is, real GDP affects the level of financial development and financial development positively affects economic growth.



Table 22: Long run causality test results

	Direction of causality (weak exogeneity test, $\alpha=0$)	
	From Real GDP to financial development	From financial development to Real GDP
Chi Square	18.29	3.68
Probability	0.00	0.05

Source: Authors' calculations

Overall, our findings revealed a bi-directional causality between financial development and economic growth in Rwanda; thereby underlying how financial development observed in Rwanda has played a role in strong growth performance for the last two decades and that environment has equally been favorable to financial development. Results are in line with most of empirical studies in developing countries. Rousseau and D'Onofrio (2013) found a bi-directional relationship between the financial sector and GDP for the case of Rwanda, in their study of 22 African countries, using alternatively monetary aggregates as percentage of GDP and credit to private sector as percentage of GDP as measures of financial development.

Alternatively, ordering real GDP ahead of financial development indicator, cointegration test confirmed the long run relationship and that financial development have a positive impact on real GDP in the long run. Although the magnitude of coefficients (2.0 against 0.5) suggests that influence from real economy to financial development is relatively stronger, this finding suggests that financial development has equally been important to real GDP growth in Rwanda.

5.4. Finance and growth nexus per sector

In this section, the analysis goes at sectoral level to assess finance and growth nexus. Nevertheless, the indicator of financial development previously used could not apply here, as data on deposits per economic sector are not available. Hence, the alternative is naturally credit per economic sector.

The primary reason for such sectoral analysis is to determine the asymmetric responses of output of various sectors to sector specific credit shocks, which allows



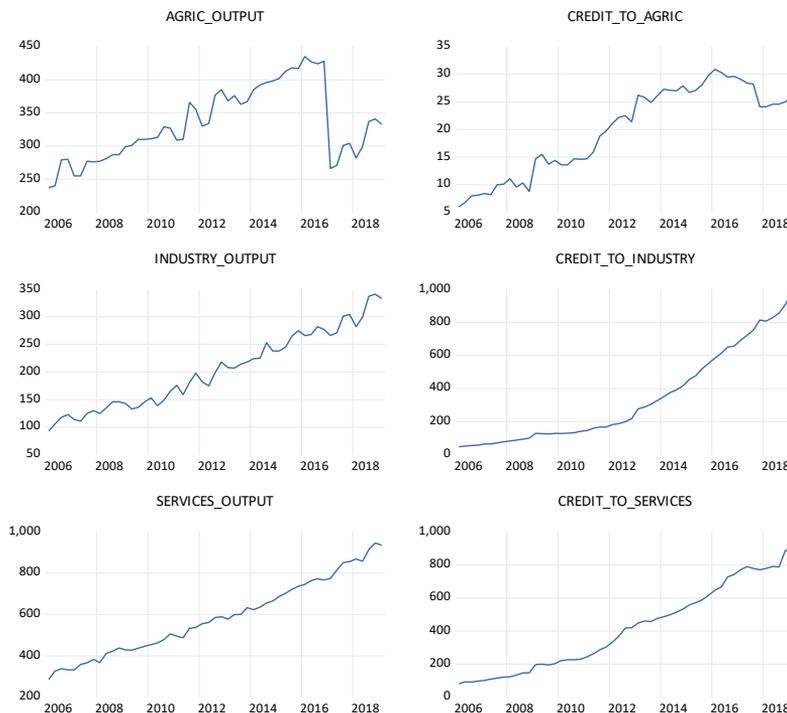
us to identify sectoral heterogeneity, if that exists, and design appropriate policy accordingly. Therefore, we estimate separate models for each sector.

The previous study for the case of Rwanda by Karangwa and Gichondo (2016) assessed the effect of sectoral distribution of commercial bank credit on economic growth. Their findings indicate that the service sector was the most sensitive to credit, followed by industry and Agriculture at the last place. The present study captures the recent period to check the consistency of results, given the changes in distribution patterns of credit to the private sector and sectoral contribution to overall country's GDP.

Graphical analysis below highlights how expansion in credit by economic sector has generally been in tandem with sectoral output. The upsurge in industry sector financing since 2013 is evident, whereas credit to agriculture sector is still low and volatile, despite the importance of agriculture sector in Rwandan economy. Important to note that agriculture sector output is to some extent weather dependent and the most salient example is the fall in agriculture production in 2017 following a drought in some parts of Rwanda. For the services sector, co-movement between credit and output has been strong and sustained overtime.



Figure 8: Evolution of key variables



Source: Authors' calculations

On the relationship between sectoral credit and output, Granger causality tests indicate that in the short run, credit to agriculture sector will not help to predict agriculture output and vice versa. Meanwhile, credit to industry sector can help to

predict industry output and vice versa, whereas credit to service sector can help to predict output of service sector but not vice versa. Although contrary to Karangwa and Gichondo (2016), we used outstanding credit per sector instead of new loans per sector. Granger causality results confirm the importance of credit for industry and service sector as earlier suggested by Karangwa and Gichondo (2016).

Table 23: Granger causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
Log of Credit to agriculture does not Granger Cause Log of Agriculture	51	1.04702	0.359
Log of Agriculture output does not Granger Cause Log of Credit to	51	1.08171	0.348
Log of Credit to industry does not Granger Cause Log of Industry	51	8.50609	0.001
Log of Industry output does not Granger Cause Log of Credit to	51	9.75557	0.000
Log of Credit to services does not Granger Cause Log of Services	51	3.44547	0.069
Log of Services output does not Granger Cause Log of Credit to	51	2.49041	0.121

Source: Authors' calculations

Regarding long run relationship, we almost followed the same methods as in the previous section and estimated a small model by each sector including outstanding credit, output and repo rate using Johansen Framework. Results tend to confirm the relationship observed in the previous estimations. Actually, the long run relationship between credit per each sector and GDP growth per sector is evident except for agriculture sector. Johansen cointegration tests indicate one cointegration relationship for industry sector model and services sector model while for agriculture sector model, there is no evidence of cointegration

About agriculture sector, its output has historically been influenced by weather conditions while the amount of credit to finance agriculture activities has been relatively low compared to its share in the economy. This particularity may explain the reason why credit and output link for agriculture sector is quasi absent.

Both credit to services sector and to industry sector exhibit a long run relationship with their respective sector output. The magnitude of coefficients (elasticity of 0.6 and 0.39 for services and industry sector respectively) indicates that the relationship is strong especially in services sector, thereby underscoring sectoral heterogeneity in finance and growth nexus in Rwanda. The coefficients on repo interest rates is small and not statistically significant. This is probably because our sample includes the period prior to 2012 where NBR was operating a strict monetary targeting



framework with shallow money markets where interest rates could sometimes not reflect financial conditions.

On the long run causality, we followed the same methodology and tested the null hypothesis of weak exogeneity. Results in the next table are well in line with the findings from aggregate model in the previous sections. In fact, the null hypothesis of weak exogeneity is rejected, implying a long run bi-directional causality between credit to industry and services with their respective sectoral output.

Table 24: Johansen cointegration equation

	Industry output			Services Output	
	Coefficients	T statistics		Coefficients	T statistics
Log of credit to industry sector	0.39	-25.46	Log of credit to services sector	0.60	-8.50
Repo rate	0.01	-1.22	Repo rate	0.02	-0.55

Source: Authors' calculations

Table 25: Long run causality test results

	Direction of causality (weak exogeneity test, $\alpha=0$)	
	From services output to credit to services	From credit to services to services output
Chi Square	16.12	16.60
Probability	0.00	0.00

Source: Authors' calculations

Table 26: Long run causality test results

	Direction of causality (weak exogeneity test, $\alpha=0$)	
	From industry output to credit to industry	From credit to industry to industry output
Chi Square	17.51	4.63
Probability	0.00	0.03

Source: Authors' calculations

6. Conclusion

The objective of this study was to examine developments observed in the financial sector in Rwanda over the last two decades, and assesses its linkages with economic



performance in Rwanda. Financial sector in Rwanda has recorded tremendous progress as detailed in this study. Its structure has evolved and currently includes commercial banks, development bank, microfinance institutions and capital markets.

In addition to the number of institutions, improvements are evident in various dimension including size, solvency, efficiency, risk management and intermediation notably in terms of loans to the economy.

Competition on the banking markets has been increasing, and banks availed an array of new products to economic agents in Rwanda. The market has also attracted a number of foreign banks.

Regarding the effect of competition on various dimension of banking sector soundness, the present study revealed that increase in price competition on the banking market would have negative effect on some dimensions of financial stability notably banks solvency and the credit risk of the banks' asset portfolio. Nevertheless, more price competition lead to improvement in banks liquidity, which is also a key indicator of financial soundness. Therefore, while fostering competition on banking market in Rwanda, it is important that the NBR in charge of financial stability, works closely with banks to continue ensure the soundness of the financial system.

The main conclusion of this study is on finance and growth nexus in Rwanda. Empirical results indicated a bi-directional causality between financial development and economic growth in the long run, thereby confirming that financial development is important for economic growth in Rwanda and vice versa . This is largely in line with some studies previously done for the case of Rwanda. Results from sectoral analysis are almost similar except for agriculture sector. For the long run, bi-directional causality is evident on both services sector and industry sector and the former exhibits a stronger link between sectoral credit and output.

These findings are also in line with most of empirical studies on developing markets as in most cases, evidences pointed to a bi-directional causality between financial development and economic growth.

Considering the fact that, financial sector development is high on the Government of Rwanda agenda. This is an additional evidence of how important the financial sector



is for future development goals and that Government policies should sustain high economic growth rate in order to continue enhancing financial sector development.

High economic growth recorded in last two decades has contributed to ongoing financial development in Rwanda. Therefore, Government programmes to sustain economic growth and transformation would be key to support this development trajectory observed in the financial sector.

A more developed financial system would also help to finance the economy in a sustainable manner, allow better saving mobilization and financial resources allocation, which is crucial for supporting Government programs aiming at boosting domestic production in goods and services such as "Made in Rwanda", meetings, incentives, conferences and exhibitions (MICE) initiative, etc. Evidences from quantitative analysis pointed out a nexus between credit and services sector and industry sector. Therefore, financial development and diversified economic growth would reinforce and sustain that synergy.

Absence of a clear link in agriculture sector underlines how critical the ongoing initiatives to de-risk the agriculture sector are. This is essential for development of agriculture sector on one side but also as an investment opportunity of the financial sector on the other side.

Going forward, it is important for policymakers to:

- (i) Continue supporting development of financial sector in terms of depth, breadth and inclusion;
- (ii) Continue ensuring strong and diversified economic growth across all sector to sustain synergy between financial development and economic growth.
- (iii) Continue de-risking all sectors of the economy notably agriculture sector
- (iv) For NBR in particular, ongoing modernization of monetary policy framework should contribute to improvement of monetary policy transmission to the real economy. In addition, safeguarding financial sector soundness is essential for financial sector development and stronger finance-growth nexus.



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Appendices

a. Diagnostic test for bank behavior equations (solvency, liquidity and NPL)

Table 27: Normality tests

Normality test			
	Equation 5 (Solvency)	Equation 6 (Liquidity)	Equation 7 (NPL)
Jarque Berra	1.19	1.91	16.80
Probability	0.55	0.38	0.00

b. Finance-growth nexus VECM

Table 28: Johansen cointegration test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.551	65.613	47.856	0.001
At most 1	0.366	27.197	29.797	0.097
At most 2	0.086	5.299	15.495	0.776
At most 3	0.020	0.958	3.841	0.328
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.551	38.417	27.584	0.001
At most 1 *	0.366	21.898	21.132	0.039
At most 2	0.086	4.340	14.265	0.822
At most 3	0.020	0.958	3.841	0.328
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 29: VECM Serial correlation test

VEC Residual Serial Correlation LM Tests						
Sample: 2006Q1 2018Q4						
Included observations: 48						
Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	23.466	16	0.102	1.545	(16, 83.1)	0.104
2	10.070	16	0.863	0.614	(16, 83.1)	0.864
3	10.188	16	0.857	0.622	(16, 83.1)	0.858
4	21.171	16	0.172	1.376	(16, 83.1)	0.174

Table 30: VECM Normality test

VEC Residual Normality Tests					
Orthogonalization: Cholesky (Lutkepohl)					
Null Hypothesis: Residuals are multivariate normal					
Sample: 2006Q1 2018Q4					
Included observations: 48					
Component	Skewness	Chi-sq	df	Prob.*	
1	0.017	0.002	1	0.963	
2	0.001	0.000	1	0.997	
3	-0.400	1.280	1	0.258	
4	0.317	0.806	1	0.369	
Joint		2.088	4	0.720	
Component	Kurtosis	Chi-sq	df	Prob.	
1	2.750	0.125	1	0.723	
2	2.760	0.115	1	0.735	
3	2.274	1.054	1	0.305	
4	3.164	0.054	1	0.817	
Joint		1.348	4	0.853	
Component	Jarque-Bera		df	Prob.	
1	0.127		2	0.938	
2	0.115		2	0.944	
3	2.335		2	0.311	
4	0.859		2	0.651	
Joint	3.436		8	0.904	



Sample (adjusted): 2006Q4 2019Q1				
Included observations: 50 after adjustments				
Series: L_SERV L_CPS_SERV REPO				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.496	48.900	35.193	0.001
At most 1	0.188	14.657	20.262	0.247
At most 2	0.081	4.230	9.165	0.379
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.496	34.243	22.300	0.001
At most 1	0.188	10.427	15.892	0.297
At most 2	0.081	4.230	9.165	0.379
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 32: Johansen cointegration test for industry equation

Sample (adjusted): 2006Q4 2019Q1				
Included observations: 50 after adjustments				
Series: L_IND L_CPS_IND REPO				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.444	48.200	35.193	0.001
At most 1	0.210	18.859	20.262	0.077
At most 2	0.132	7.050	9.165	0.124
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.444	29.341	22.300	0.004
At most 1	0.210	11.809	15.892	0.197
At most 2	0.132	7.050	9.165	0.124
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				



Access to credit among manufacturing firms in Rwanda: An assessment of supply-side challenges

Patrick Hitayezu³

Callixte Kamanzi⁴

Christian Manishimwe⁵

Charles Kamugisha⁶

³ Director, Research Department, National Bank of Rwanda

⁴ Economist, Research Department, National Bank of Rwanda

⁵ Senior Economist, Monetary Policy Department, National Bank of Rwanda

⁶ Principal Economist, Monetary Policy Department, National Bank of Rwanda



Abstract

Despite its high potential to fast-track economic transformation, the manufacturing sector's performance remains at lower levels among developing economies, including Rwanda. Global evidence suggests that the sluggish performance could be partly attributed to inadequate access to external financing sources such as banks. Economists contend that imperfections in credit markets often result from supply-side challenges related to information asymmetry between lenders and borrowers. The objective of this study is to assess two dimensions of credit constraint (namely credit discouragement and loan rejection) and investigate firm-level determinants of credit-constraint among manufacturing firms in Rwanda. To that end, the study employs cross-sectional data from a survey of 122 formal manufacturing firms in Rwanda. To test various hypotheses related to information asymmetry, a probit regression model is used.

The results of descriptive analysis show that, in 2018, about 27 percent of manufacturing firms were credit-constrained. Probit regression model estimation results show that the likelihood of credit constraint significantly decreases with firm size and age, suggesting that lack of sufficient collateral or lengthy credit history among smaller and younger firms constrain their access to credit. The results also show that the odds of credit constraint increase with product innovation, signifying the negative effect of manufacturer's informational advantage over the lender. The probability of credit constraint also decreases with bank visits, implying that good relationship with banks alleviates potential information asymmetry. The revealed negative impact of information asymmetry on access to credit implies that policy initiatives that aim to bridge the information gap on the credit market (e.g. credit reference bureau) could positively support industrial development by relaxing manufacturers' credit constraint. For smaller and younger manufacturing firms, government-supported guarantee schemes could address the challenge related to sufficiency of collateral.

Keywords: credit rationing, information asymmetry, manufacturing sector, Rwanda

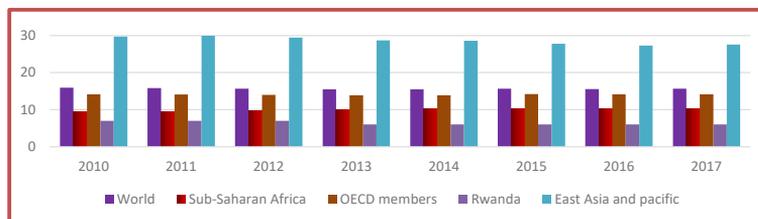
JEL classification: L1, D4

1. Introduction

Promoting the manufacturing sector is a fundamental path to economic growth and structural change. Evidence from developed and developing countries suggests that the sector supports rapid structural changes and drive economies along sustainable growth paths. The impact pathway consists of, *inter alia*, higher productivity growth, technological progress, job creation, capital accumulation, forward and backward linkages, and scale economies. Historical narratives show that development approaches focusing on the manufacturing sector transformed economies such as the United States, United Kingdom, France, Japan, and Germany into world's wealthiest nations. A recent example is China, whose industrialization helped bringing the country on the list of world's fastest growing economies (Signé, 2018).

Despite its high potential for economic growth and transformation, the manufacturing sector's performance in sub-Saharan Africa lags behind the rest of the world, even among developing countries. In 2018, sub-Saharan Africa's manufacturing value added (MVA) was only about \$166 billion US dollars, compared to above \$4551 in East Asia developing countries and \$7214 in OECD members. In addition, manufacturing only represents on average 10 percent of total GDP in sub-Saharan Africa, lagging behind other developing regions. Although African countries continue their efforts to catch up with the industrial development of advanced economies (with average MVA growth rate since 2010 standing at 4.3 percent in sub-Saharan Africa against the 3.0 percent world's average), evidence has shown that their shares of manufacturing sector are peaking at an earlier stage compared to advanced economies (UNECA, 2017).

Figure 1: Manufacturing, value added (% of GDP)

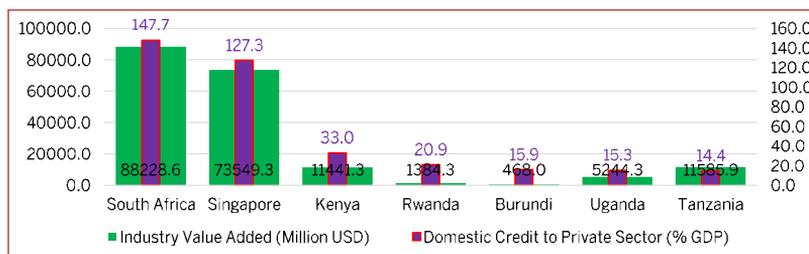


Source: Authors' computation using World Bank data (<https://data.worldbank.org/>).



The failure to achieve more growth in the manufacturing sector results from various factors including inadequate access to finance, lack of competitiveness, smaller market size, low quality of human capital, infrastructure gaps, and policy and regulatory failures. In Africa, empirical evidence shows that the percentage of firms citing access to finance as a major or severe constraint is higher compared to any other constraint such as electricity, corruption, macro-economic instability, and labor regulations (Gelb, et al., 2007; Kerr & Nanda, 2009). About a quarter of manufacturing firms are credit-constrained (Bigsten, et al., 2003), and credit-constrained manufacturing firms experience slower growth compared to their counterparts (Fowowe, 2017). Credit constraint is also a major impediment to international trade among manufacturing firms (Manova, 2013). This micro-level evidence is consistent with the macro-level figures below showing that countries with higher levels of credit to the private sector exhibit higher industry value added.

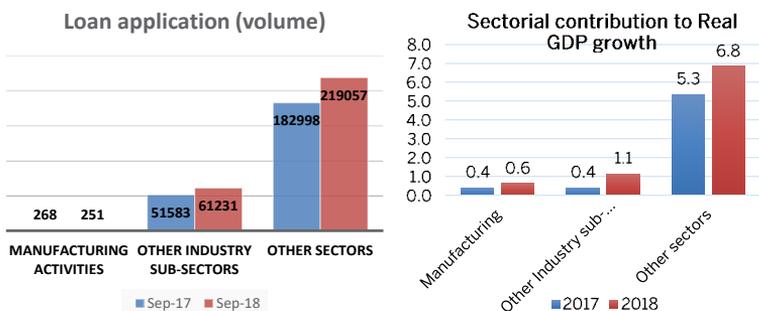
Figure 2: Domestic credit to private sector and industry value addition



Source: Authors' computation using World Bank data (<https://data.worldbank.org/>).

As Figure 2 suggests, Rwanda has not been an exception. The manufacturing sector has accounted for a considerably lower share of loan applications over the last couple of years, coinciding with a period when the contribution of manufacturing sector to GDP growth was at very low levels.

Figure 3: Loan application volume by sector (2017-2018)



Source: Authors' computation using NBR data (<https://data.worldbank.org/>).

Past surveys of manufacturing firms conducted by the Ministry of Trade and Industry (MINICOM, 2012, 2017) showed that capacity utilization among manufacturing firms remains lower, and more than 30 percent of manufacturers consider inadequate access to finance to be a major concern. Insights from the surveys suggest that around 36 percent of manufacturing firms had received loan, and banks were the main source of external financing, accounting for 83 percent of credit to the manufacturing sector (MINICOM, 2012). The surveys further showed that 19 percent of firms that had not received any loan were credit constrained, i.e. their loan application had been unsuccessful.

This situation raises an important policy question regarding the factors constraining access to credit among manufacturing firms and appropriate remedies. While demand-side problems (related to firm's reluctance to take advantage of external finance) have been substantiated, global evidence suggests that supply-side challenges are more pronounced (Abraham & Schmukler, 2017; Ramlogan & Rigby, 2012). These challenges arise when credit-worthy firms do not have access to credit due to market imperfections such as information asymmetry. Indeed, the World Bank suggest that by 2013, 20 percent of SMEs in advanced economies, 28 percent of SMEs in middle income countries, and 44 percent of SMEs in low-income countries



needed loan but refrained from applying for credit due to the fear of rejection (Abraham & Schmukler, 2017).

It is therefore important to understand supply-side challenges constraining manufacturing firms' access to credit in Rwanda. Several case studies were conducted in different developing countries to shed light on factors explaining credit-constraint among industrial firms. To the best of authors' knowledge, little or no empirical literature exists on determinants of Rwandan manufacturing firms' access to credit. To fill this gap, this study sets out to assess the incidence of credit-constraint among manufacturing firms in Rwanda. Specifically, the study aims to estimate the prevalence of two dimensions of credit-constraint, namely credit-discouragement and loan rejection. Based on theoretical predictions of the information asymmetry hypothesis, the paper also investigates the determinants of credit constraint among manufacturing firms in Rwanda.

2. Literature review

2.1. Imperfect information, adverse selection, moral hazard, credit rationing and collateralization

Credit rationing by banks is a well-known outcome of credit market imperfection. The starting point of analysis of imperfections in the credit market is asymmetry of information between banks and their clients. The early theoretical work of Stiglitz and Weiss (1981) showed that if lenders are not so well informed about the characteristics or behavior of borrowers, loan contracts could potentially result in adverse selection and moral hazard, two key distorters of an efficient market allocation mechanism.

Adverse selection results from the fact that borrowers differ in their probability of repayment, and using interest rate (or other terms of contract) as a screening device may not be optimal since, on average, high-risk borrowers exhibit higher willingness to pay higher interest rates compared to their low-risk counterparts. Moreover, ex-post behavior of borrowers may be influenced by terms of loan contract. For instance, if the cost of borrowing increases, low-risk borrowers may be incentivized to switch to high-risk projects or reduce their efforts towards the success of the project. This results into the problem of moral hazard (Stiglitz & Weiss, 1981).



As Stiglitz and Weiss (1981) demonstrate, unresolved adverse selection and moral hazard problems may lead to a credit rationing. Banks may prefer to ration credit instead of raising the interest rate, leading to excess demand for loan. In this case, price does play its role of market clearing (and hence efficient resource allocation) mechanism. However, Bester (1987) argues that no borrower will be denied credit, provided the contract can provide some perfect screening devices. He demonstrates that collateral and other non-price elements (such as past experience, reputation and other forms of borrower self-insurance) can be used a signaling mechanism to alleviate negative adverse selection and moral hazard problems. Bester (1987) contends that only low-risk borrowers may be willing to offer higher collateral (hence reducing the scope of adverse selection), and higher degree of collateralization may curb the tendency to divert capital towards high-risk projects or commit less effort in the investment project.

However, in his conclusion, Bester (1987) cautions that some potentially low-risk borrowers cannot provide the required collateral or may not be able to provide credit record or any other reputational capital. This is often the case of enterprises that are at early stages of growth and therefore may not afford the collateral required by banks or provide sufficient track record, even if they have low-risk business projects. In this case, the resulting disproportionately less access to credit by smaller and younger businesses is not a direct consequence of market imperfection, but as a consequence of equilibrium credit rationing (Ramlogan & Rigby, 2012).

2.2. Firm-level determinants of credit constraint

To support Stiglitz and Weiss's (1981) theory of credit rationing, empirical studies have based their conclusion direct measurement of collateral as well as other proxies of information on firm-specific credit risk profile.

Among all the proxies of information, firm size has received a disproportionately higher attention in the empirical literature. Smaller firms often lack sufficient collateral and are often perceived to entail relatively higher idiosyncratic risk of failure compared to larger firms. In addition, extending credit to smaller firms entails higher fixed and proportionate transaction costs to the lender (Drakos & Giannakopoulos, 2011). These include the unit cost of screening applications under potential adverse



selection and the proportionate cost of monitoring credit to curb potential moral hazard. Closely related to firm size is firm age. The literature suggests that informal asymmetry between lenders and firms decreases with firm age. Compared to younger firms, older firms have longer track record and have more developed relationship with banks, which decreases information asymmetry (Binks & Ennew, 1996). Moreover, longevity may signal survival ability of firm, which increases the quality of management and hence firm's reputational capital (Drakos & Giannakopoulos, 2011).

Empirical studies have found that smaller and younger firms are more credit constrained than larger and long established firms are. Among 80 developing and developed economies, a study by Beck et al. (2006) found that older and larger firms report less financing obstacles. In the US, Levenson and Willard (2000) reported that constrained firms are smaller, younger, and more likely to be owned by their founders. Among southeastern and eastern European economies, respectively, Hashi et al. (2010) and Drakos & Giannakopoulos (2011) found that that the cohort of small manufacturing firms is relatively more credit constrained. Several large-scale studies conducted in Africa have found a positive relationship between manufacturing firm size and access to credit (Bigsten, et al., 2003).

Working relationship with lender could be a substitute to collateral (Binks & Ennew, 1996). It provides banks with a clearer picture on the environment under which a particular business operates, the managerial attributes of the firm and the real prospect of the business (Drakos & Giannakopoulos, 2011). In Italy, as an example, Ferri and Messori (2000) report that close customer relationships between local banks and firms promote a better allocation of credit in the north and center of Italy.

Financial opacity is another factor that can help reduce information asymmetry between banks and borrowers. Auditing and international accounting standards are often mentioned among potential source of financial transparency. Dharan (1992) argue that auditor's opinion accurately conveys to the bank some key information on various firm's risk characteristics and therefore, firms choose to pay for costly external auditing services in order to send a signal of their (low) risk profile to potential lenders.

There may also be an ownership effect on firm access to credit, mainly via the effect of regulations and reputation on information asymmetry. As Berger and Udell (1998) assert, firms that are required to publicize their financial statements such as publicly-listed firms and some state-owned enterprises are less informationally opaque, compared to privately owned firms. In addition, state-owned firms face less credit constraints because of the variety of government subsidies (Isachenkova & Mickiewicz, 2003). The unique advantage of foreign-owned enterprises on the credit market pertains to their relatively better access to collateral as well as lender's positive perception about their governance and performance (Harrison & McMillan, 2003). Firms owned by family members (who are residual claimants) are likely to adopt more conservative investment strategies, as well as, minimize the probability of bankruptcy thereby reducing risk (Claessens & Tzioumis, 2006). In Ivory Coast, for example Harrison & McMillan (2003) showed that, compared to foreign firms, domestic firms are more credit constrained.

Firm innovation also plays an important role in the credit market. Rationing of credit by banks may intensify for projects entailing intangible and highly innovative investments such as research and development due to informational advantage of the inventor over the investor (Freel, 2007; Lee, et al., 2015). Lender's inability to distinguish good projects from bad could potentially lead to adverse selection and moral hazard issues. Recent studies have shown that the likelihood of credit rationing are intensified for more innovative firms (Freel, 2007; Lee, et al., 2015).

The substantial effect of sectoral heterogeneity has also received attention in the empirical literature. Economists have shown that lenders often use industry classification as a screening mechanism. This is because, based on their historical performance, sectors of activity can easily provide information on project performance and overall borrower's credit worthiness (Drakos & Giannakopoulos, 2011).

In well-functioning credit markets, lenders base their decisions on the overall financial soundness of firms and on expected performance and projected cash flows, adjusted for risks and transaction costs, rather than upon firm size or age. In turn, firms with increasing sales and profits, increasing turnover (sales/assets) ratios, lower volatility of sales or lower liabilities to assets ratios, would be expected to have greater access to credit and less credit constraints (Bigsten, et al., 2003; Cressy, 1996). In East

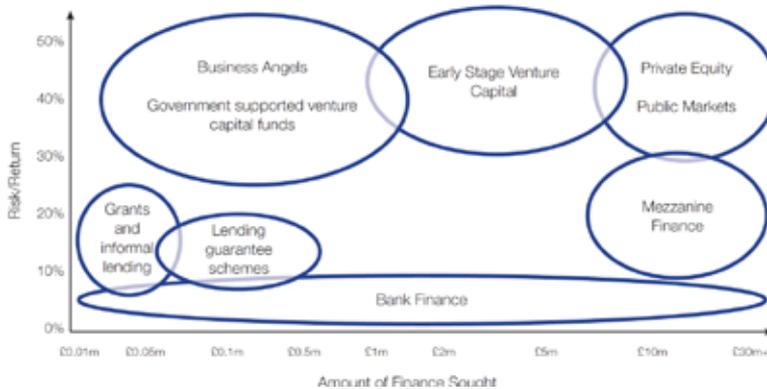


African region Buyinza and Bbaale (2013) reported that manufacturing firm performance has a bearing on the probability of a firm's access to credit.

2.3. Third-party intervention: rationale and options

The fact that smaller and younger firms experience relatively limited access to credit due to lack of collateral has been the theoretical foundation of government and trade association' interventions in the credit markets (Riding & Haines, 2001). There are several tools that third party intervention use to secure access to loans for smaller and younger enterprises. In their review, Rowlands et al. (2009) identifies five "escalators of finance" that allows firms to move from start-up, expansion and growth into a larger firm. As shown in the figure below, bank loans remain the building block throughout firm's growth path but, as the theory reviewed above demonstrates, this escalator only applies to low-risk projects.

Figure 4: External financing options by firm size and project risk level



Source: Rowlands et al. (2009)

For smaller firms with riskier projects, two important government-backed escalators apply, namely guarantee schemes and venture capitals. Guarantee schemes lower shadow price of credit (i.e. interest rate and non-price tools), relaxing smaller firms' access to credit (Honohan, 2010). However, just like the lender, the guarantor may face the same information asymmetry. Therefore, credit guarantee schemes are simply meant to help lenders gaining initial experience working with smaller firms, an experience that would have been otherwise very costly. Breaking this information gap would then help the lender continue working with smaller borrowers without needing further intervention of the guarantor (Honohan, 2010).

For relatively higher risk projects, government-sponsored venture capitals (GVCs) provide another escalator of finance. Unlike private venture capitals, GVCs are not primarily guided by financial objectives. Instead, as Colombo, et al. (2016) argue, governments select projects that are not satisfactory in terms of risk-return but have higher potential to generate social (e.g. through innovation or employment generation) or localized public benefits (e.g. employment creation in economically underserved regions). On the credit market, GVCs decreases information asymmetry between firms and banks through two main channels, first with decreased firm opacity (e.g. through certain requirements such as publications of financial statements), and decreased risk of failure due to government subsidies (Berger & Udell, 1998).

3. Methodology

This section discusses the empirical model adopted in the study, source of data, model specification, and variables used to analyze firm-based factors influencing credit constraint among manufacturers.

3.1. Empirical model

The general model employed in the empirical framework utilizing different specifications and estimation methods is represented as follows:

$$Y_i = \alpha + \beta X_i + \varepsilon_i \quad (1)$$



Where Y_i represents various measures of financing constraints; X_i the vector of variables representing different firm characteristics; α , β , parameters to be estimated; and ε_i the random error.

For estimation purposes, we apply Probit model as the most appropriate model (Drakos & Giannakopoulos, 2011). This is a probability model, with only two possible outcomes, which we denote as 1 and 0, and represents the presence/absence of a certain condition..

Firm i will be considered financially constrained if $Y_i = 1$. Under the assumption that ε_i is a normally distributed random error with zero mean and unit variance, the probability that firm i is financially constrained can be written as

$$\begin{aligned} \text{Prob}(Y_i = 1) &= \text{Prob}(\alpha + \beta X_i + \varepsilon_i = 1) & (2) \\ &= \Phi(\alpha + \beta X_i), \end{aligned}$$

Where Φ represents the standard normal cdf.

3.2. Model specification

3.2.1. Dependent variable:

In this study, credit-constraint (CONSTRAINED) capture two key dimensions of credit constraint, namely credit discouragement and loan rejection. Following Drakos and Giannakopoulos (2011), A dummy variable was used, whereby 1 represents a firm that (i) needed bank/MFI credit in 2018 but considered it as irrelevant or did not simply apply due to fear of rejection, (i.e. credit-discouraged), or (iii) applied but application was rejected. The variable took the value of 0 if (i) firm did not apply for loan for any reason other than fear of rejection, or (ii) firm obtained credit from the banking sector.

3.2.2. Independent variables

Based on the empirical literature briefly reviewed in Section 2.2, the following variables were used to investigate potential effect of information asymmetry on credit constraint.

Single ownership of firm (SINGLEOWNER) is a dummy variable taking the value of 1 if the firm is owned by one investor only, and 0 otherwise (i.e. owned by a partnership of investors). The expectation was that, compared to partnerships, sole proprietorships would be more informationally opaque and hence credit-constrained, due to lack of legal or regulatory requirements such as publishing financial statements.

Number of employee (COMPSIZE) is a categorical variable depicting the size of firm in terms of number of employees. The variable takes the value 1 if the firm has 3 employees or less (micro-enterprise), 2 if the firm employees 4 to 30 people (i.e. small enterprise), 3 if the firm has 31 to 100 employees (i.e. medium enterprise) and 4 if firm employs more than 100 employees. As the theory and empirical evidence show, smaller firms are more likely to have insufficient collateral, thereby facing the challenge of access to credit.

Registration year (REGYEAR) is a date variable meant to measure the age of the firm. Firm age is an indicator of experience with credit market and credit history. Therefore, credit constraint is expected to decrease with firm age.

Three proxies of financial transparency are used. External auditing (EXTERNALLAUDIT) and internal auditing (INTERNALAUDIT) are dummy variables used to measure the availability of auditor's opinion on the firm's finances. It takes the value of 1 if firm hired or received external auditor(s) to audit its finances and 0 otherwise. International accounting standards (ACCOUNTINGSTANDARDS) is another dummy capturing firm opacity in terms of adoption of accounting standards that ease banker's understanding of the firm's financial situation. The variable takes the value of 1 if the firm used an accounting software and 0 otherwise. Credit constraint was expected to decrease in these three variables.

Product innovation (NEW_PRODUCT) is a dummy variable that takes the value of 1 if the firm introduced a new or significantly improved product or service to the market in 2018 and 0 otherwise. This variable measure the extent of manufacturer's informational advantage over the lender. Therefore, credit constraint was expected to increase with product innovation.

Visits to the bank (BANKVISIT) is a categorical variable that measures banking relationship by the number of visits made to the bank. The variable takes the value of



0 to 6, where 0 stands for “never visits the bank”, and 6 stands for “visits the bank once a week”. The intensity of relationship with the banker was expected to increase banker’s knowledge on the situation of the manufacturer, thereby decreasing the prospect of credit rationing.

Value of own lands and buildings (LANDBUILD) in FRW is a continuous variables capturing potential collateral for loans. Potential collateral value was expected to increase firm’s ability to signal its credit-worthiness on the market, thereby reducing firm’s credit constraint.

Return on equity (ROE) was used as an indicator of firm’s performance in 2018. Other factors remaining unchanged, financial performance was expected to be the basis of loan supply decision making.

Two control factors were also included. Manager’s education (MANAGEREDUCATION) is a categorical variable taking the value of 1 if general manager does not have any university degree, 2 if he/she holds an undergraduate degree and 3 if he/she holds a postgraduate degree. Manager’s experience (MANAGEREXPERIENCE) is a count variable capturing the number of years spent by the firm’s general manager in managerial position in firms.

3.3. Data

This study uses data from a survey on access to finance of industrial firms that was conducted by the National Bank of Rwanda throughout. The data was collected from a sample of 129 industrial firms. The sample selection followed a 2-stage cluster sampling approach, using a long list of registered manufacturing firms provide by the National Institute of Statistics of Rwanda. In the first stage, 12 divisions of activities were purposively selected from the long list of registered manufacturing firms, based on the ISIC classification. In the second stage, firms were randomly selected using a simple random sampling method. The sample covered the city of Kigali and all the provinces. Outside Kigali, interviewed firms were from various districts including Rubavu, Rwamagana, Nyagatare, Nyaruguru, Nyamasheke, and Rulindo.

The survey used a structured interview questionnaire. The survey questionnaire was structured into three main sections. One section focused on firm-specific details



(including registration, ownership, management, and performance). Another section included questions on firm financing, including relevant sources of internal and external financing, perceptions about the banking sector and capital market and experience with credit market. To avoid issue related to recall bias, only the details of credit history in 2018 were captured. The history included loan application and outcome, loan size and use, and repayment performance. The last section of the survey questionnaire captured information from two financial statements of firm namely, balance sheet and income statement. The questionnaire was coded in SurveyCTO which was the platform used to collect data.

The questionnaire was administered using face-to-face interview. A team of 12 enumerators composed of Young Economists from the National Bank of Rwanda was trained beforehand. After pilot-testing the instrument, face-to-face interviews took place from May to June 2019, using tablets. Interviews took place within the premises of firms. Respondents were primarily senior managers of firms, with good knowledge of firm financing. A consent form was included in the questionnaire, and respondents were asked at the beginning of the face-to-face survey if they agreed to be a part of the study. On average, an interview took 1 hour and 21 minutes.

4. Results and discussion

4.1. Basic characteristics of Rwandan manufacturing firms

4.1.1. Firm ownership, age and size

On legal status of manufacturing firms in Rwanda, the results indicate that, by 2018, 68 percent of firms were registered as companies, while 32 percent were enterprises (i.e. under sole proprietorship statute). The analysis also reveals a diverse ownership structure, with single investors owning around 33 percent of manufacturing firms, while partnership of local investors stood at 20 percent. Family ownerships was estimated at 15 percent. The share of foreign ownership in Rwandan manufacturing industry stood at 21 percent.

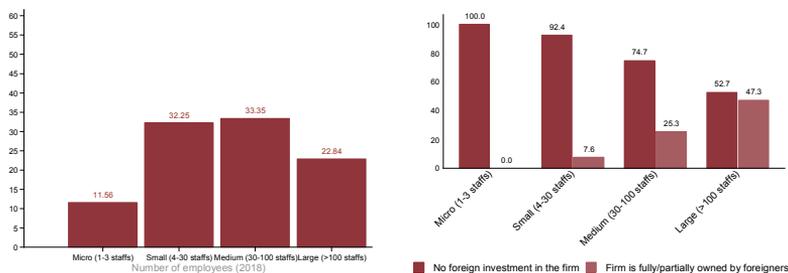


Analysis of firm age reveals that majority of firms are 5-year old or more. Only 21 percent of firms were 5-year old or younger. Firm ownership was equally distributed across the age categories, i.e. the younger and older firms had an equal shares of single, family, and foreign investors.

Firm size was analyzed based on the Ministry of Trade and Industry’s (MINICOM) definition that classifies firms under four categories (i.e. micro, small, medium and large) based on three criteria, namely number of employees, turnover and capital investment. The results in Figure 5 suggest that, based on the number of employees, about 77 percent of manufacturing firms in Rwanda could be categorized as micro, small and medium enterprises (MSMEs), i.e. firms employing less than 100 workers. However, on the basis of turnover and capital investment, our data suggest that only 26 percent of manufacturing firms could be classified under the MSMEs category, other being large. MINICOM’s guidelines suggest that the final categorization of firm will depends on a minimum of two criteria.

An interesting finding is that firm size is positively related to foreign ownership. As the figure shows, the share of foreign ownership increases with firm size, from 0 percent among micro firms to 47.3 percent among large firms.

Figure 5: Size of manufacturing firms in Rwanda by ownership



Source: Authors' analysis using survey data.

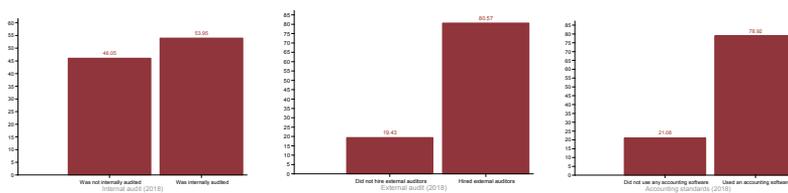
4.1.2. Firm management and governance

With regard to governance, the results suggest that around 59 percent of manufacturing firms in Rwanda are managed by their owners, which could potentially compromise managerial skills and manager’s performance appraisal. Nevertheless, managerial skills were not a considerable issue. Assessment of general managers’ level of education indicates that only 29 percent of managers had no university degree. The rest held undergraduate (34 percent) or postgraduate (37 percent) degrees. In terms of experience, 73 percent of general managers had more than 10 years of experience with firm management. However, gender was unequally distributed, with males dominating in firm management. Only 12 percent of manufacturing firms were managed by females.

Further analysis shows a positive relationship between firm ownership and management quality. Foreign ownership seems to be missing (i.e. 0 percent) among firms managed by a high-school certificate holder, but this share sharply increases to 50.8 percent among firms owned by foreigners.

In terms of financial opacity, the results in Figure 6 show that 54 percent of manufacturing firms in Rwanda had conducted internal audit in 2018. Only about 19 percent of firms did not hire external auditors in 2018. Moreover, 21 percent of firms did not use any standard accounting software during the reference period. More than 90 percent of firms reportedly had formal strategic plans.

Figure 6: Usage of internal audit, external audit, and accounting software



Source: Authors’ analysis using survey data.



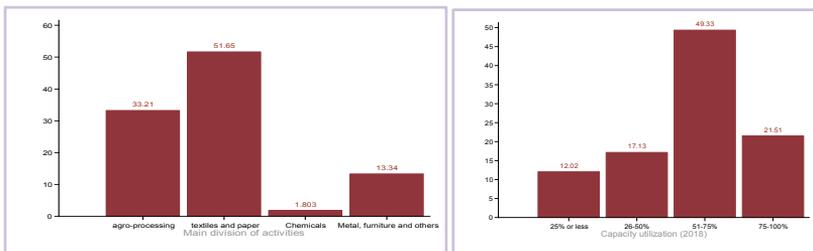
Interestingly, there was a clear relationship between financial opacity and firm ownership. The results indicate that foreign ownership was absent (i.e. 0 percent) among firms that were not externally audited, and only 3.1 percent among those that did not use standard accounting software. With regard to single ownership, an opposite effect is observed. The result shows that single ownership drops from 62.3 percent among externally audited firms to 26.0 percent among firms that did not hire any external auditor. A similar distribution of single ownership was observed across categories of usage of standard accounting software. This finding suggests that increasing diversity of ownership decreases financial opacity among manufacturing firms in Rwanda.

4.1.3. Firm activity, innovation, and performance

The results in Figure 7 suggest that, by 2018, the textile, paper and leather industry was the dominant subsector in the manufacturing sector (52 percent), followed by agro-processing (33 percent). Manufacturing firms were innovative, with 52 percent having introduced a new product in the market in 2018, while 57 percent had adopted a new or improved production method. The innovation supported a good performance, as 64 percent of manufacturing firms earned above 5 million FRW profit before tax in 2018. In terms of return on equity (ROE), the results show that 53.1 percent of firms had achieved more than 5 percent ROE. There was no significant effect of product innovation on earnings before tax or ROE.

The current output of the sector, however, remains below the potential. Consistent with the findings of previous industrial surveys in Rwanda (e.g. industrial survey 2011 and 2016) that found that average capacity utilization of around 50 percent, our results suggest that only 21 percent exploit above 75 percent of their production capacity. Nearly 50 percent of manufacturing firms utilize between 50 and 75 percent of their capacity, while the rest (about 29 percent) operate below 50 percent of their capacity. This important finding suggests that majority of manufacturing firms can increase their current production levels without resorting to new investments.

Figure 7: Firms' sectors of activity and capacity utilization

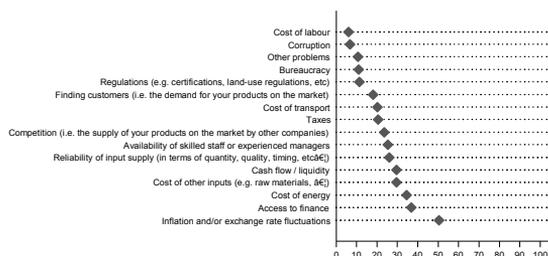


Source: Authors' analysis using survey data

Analysis of challenges faced by manufacturing firms (see Figure 8) ranked exchange rate fluctuations at the top. Around 50 percent of firms had been reportedly facing challenges related to exchange rate depreciation. This finding may reflect a challenge related to cost of imported raw materials amid the recently increasing rate of depreciation of Rwanda Francs (FRW) against the US dollar. Indeed, 30 percent of firms reported to face the challenge of high cost of raw materials. As expected and consistent with previous survey data analyses, the next top challenge cited by firms was access to finance. This challenge was reported by 36 percent of firms, supporting the objective of the current study. An equally important challenge was cost of energy, as reported by nearly 34 percent of firms. Cash flow-related challenges were reported by 29 percent of firms. Unlike previous survey findings, our results suggest that tax exerts a considerable challenge to 20 percent of manufacturing firm.



Figure 8: Key challenges faced by manufacturing firms in Rwanda (2018)



Source: Authors' analysis using data from survey.

Firms with different characteristics were reportedly facing different challenges. The effect of firm size was outstanding. Firms in the MSMEs category were more likely to report various challenges (including access to finance), except cost of labor. Firms in both categories were equally likely to report tax and cost of transport as challenges.

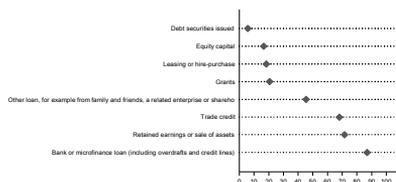
Other results show that, compared to other firms, firms with some foreign ownership are 25 percentage points more likely to report cost of transport as a key challenge, and about 13 percentage points less likely to report finding customers and competition as key challenges. Firms in both categories were equally likely to report access to finance as a key challenge.

4.1.4. Financing sources

Analysis of the financing structure of manufacturing firms in Rwanda suggest a considerable level of diversification. Manufacturers employ both internal and external sources to finance their activities and investments. Nearly 72 percent of firms consider retained earnings as a relevant source of financing, underscoring the

importance of internal financing. With regard to external financing, banks or microfinance loans were reportedly the most relevant sources (87 percent), followed by trade credit (68 percent) and informal loans (45 percent).

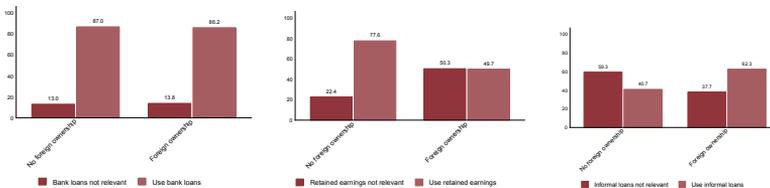
Figure 9: Relevant sources of finance among manufacturing firms in Rwanda (2018)



Source: Authors' analysis using survey data

Ownership by foreign investors had no effect on the source of financing. Nevertheless, the results in Figure 10 show that foreign-owned firms were 28 percentage points less likely to employ retained earnings, and 22 percentage points more likely to resort to informal financing sources.

Figure 10: Relevant sources of finance by foreign ownership (2018)



Source: Authors' analysis using survey data

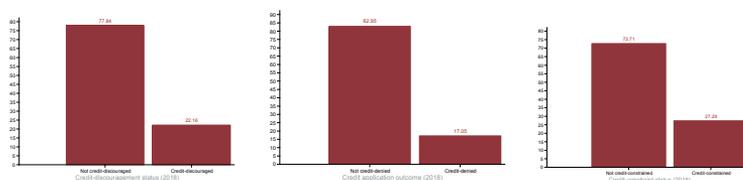


4.1.5. Experiences with bank credit: Access, discouragement and rejection

Manufacturing firms had a good experience with credit market. By 2018, around 77 percent of manufacturing firms had applied for bank loan at one point in time. For 47 percent of firms, the need for bank loan increased in 2018. Around 53 percent of firms applied for loan in the same year, 90 percent of which were channel to commercial banks⁷. Addressing liquidity or working capital needs was the dominant purpose for loan application (51 percent) followed by financing new investments (42 percent). These findings support the trade credit as important source of external finance among the manufacturing firms in Rwanda, and points to the fact that most firms borrow to optimize the use of the productivity capacity.

As shown by its two dimensions, credit constraint was substantial. The results in Figure 11 suggest that 22 percent of firms were credit-discouraged, i.e. they did not apply for any loan (in 2018 or before) or considered bank loan as an irrelevant external financing source due to fear of demand loan rejection. Actual loan rejection rate stood at 17 percent of loan applications in 2018. Our findings suggest that, over time, manufacturers have gained a good understanding of their credit score (i.e. likelihood of obtaining bank loan), and those that potentially could not qualify would self-select out of credit market.

Figure 11: Credit discouragement, rejection and constraint (2018)



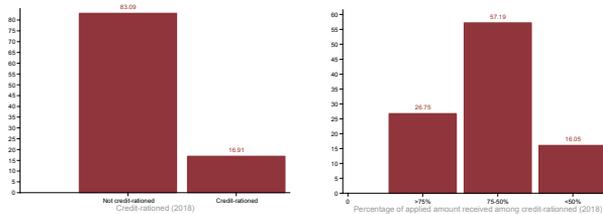
Source: Authors' analysis using survey data

⁷ The 2011 Industrial Survey reported that 83 percent of loans were obtained from banks

In total, 27 percent of firms were credit-constrained, i.e. they were either credit-discouraged or had unsuccessfully applied for bank loan. A previous finding from the 2011 Industrial Survey conducted by MINICOM reported that only 8 percent of firms were credit-constrained. However, the 2011 Industrial Survey did not capture firms that were credit-discouraged, an important aspect of credit constraint that the current study attempts to analyze.

Another important aspect limited access to credit is rationing of credit amount. The results in Figure 12 suggest that 17 percent of firms that obtained loan received amounts that are lesser than what they had applied for⁸. The figure shows that the majority (i.e. 57 percent) of credit-rationed firms received between 50 and 75 percent of the amount that they had applied for. This challenge can potentially lead to moral hazard in the form of partial implementation of projects, as well as capital diversification and asset substitution.

Figure 12: Credit rationing among manufacturing firms in Rwanda (2018)



Source: Authors' analysis using survey data

4.1.6. Some characteristics of credit-constrained firms

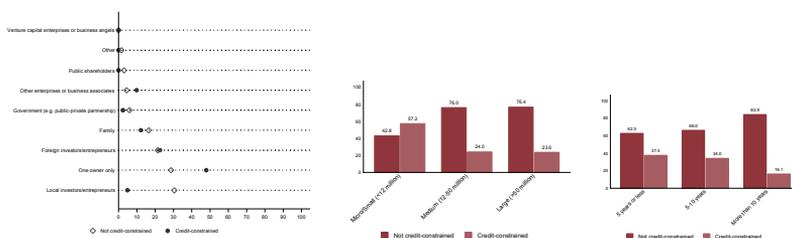
Evidence from survey data shows that access to credit and firm characteristics discussed above were closely correlated. In terms of ownership, Figure 13 below shows that the likelihood of credit constraint was 20 percentage points higher among firms owned by one single person compared to firms owned by multiple investors.

⁸ Data from the 2011 Industrial Survey had suggested a credit rationing of 18 percent.



The figure further shows that credit constraint was not an issue among firms owned by local investors. Figure 13 further reveals firm size as a key determinant of credit constraint. Compared to medium and large enterprises, micro and small enterprises were 33 percentage point more likely to be credit-constrained. In terms of age, the results in Figure 13 reveal also that the likelihood of credit constraint was 18 percentage point smaller among 10-year and older firms, compared to younger firms. These preliminary results are indicative of supply-side challenge of information asymmetry that leads to lender’s reluctance to extend credit to firms without sufficient physical or reputational collateral or at higher transaction cost.

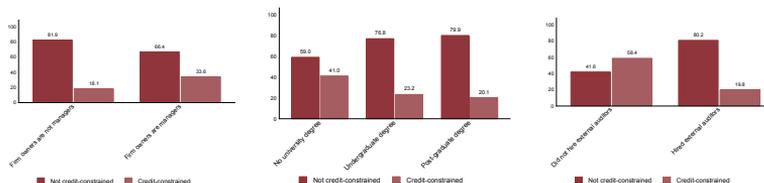
Figure 13: Credit rationing by firm ownership, size and age (2018)



Source: Authors’ analysis using survey data

Firm management was also correlated with credit constraint. As Figure 14 indicates, firms managed by their owners were 15 percentage points more likely to be credit-constrained. To the extent that separation between firm ownership and management signals quality of firm management, this finding suggests that lenders take quality of firm management into account when screening potential borrowers. This assertion is confirmed by the finding that education of firms’ managers, an indicator of firm management performance, was also found to be correlated with credit constraint. Compared to firms managed by university degree holders, firms with less educated managers were at least 18 percentage points more likely to be credit-constrained. External auditing, a key indicator of financial opacity, was also correlated with credit constraint. As expected, the likelihood of credit constraint was nearly 30 percentage point lower among externally audited firms. To the extent that these factors reduces firm opacity by increasing the transparency of financial management, these findings corroborate with the previous results pointing to the issue of information asymmetry.

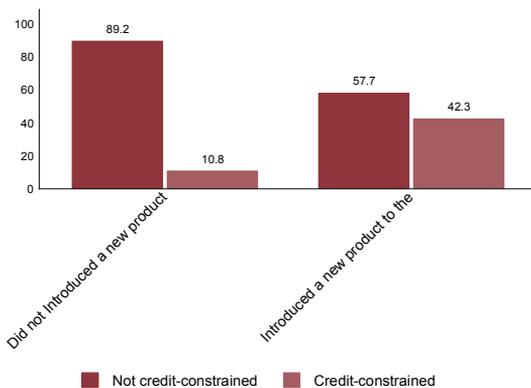
Figure 14: Firm management and credit constraint (2018)



Source: Authors' analysis using data from survey.

Firm innovation had a clear negative correlation with of credit constraint. Manufacturing firms that adopted new or improved products had more challenges with access to credit. Their likelihood of credit-constraint was 32 percentage points higher, compared to more conservative firms. As pointed out in the literature review section, this finding means that introducing new products increases information asymmetry and may lead to moral hazard problems or adverse selection.

Figure 15: Firm innovation and credit constraint (2018)

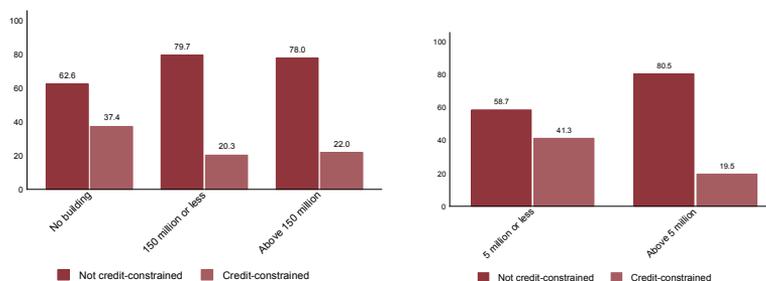


Source: Authors' analysis using survey data.



As expected, collateral value was a considerable predictor of access to finance. As show in Figure 16, firms that had no land or building were about 16 percentage points more likely to be credit-constrained. The figure further shows that firm’s credit-constraint reduced with its performance. Firms that earned 5 million or less in profit before tax were 22 percent more likely to be credit constrained. This finding points to the role played by firm’s performance in accessing to bank loan in Rwanda.

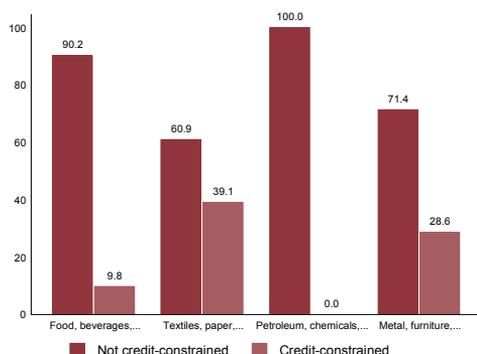
Figure 16: Value of lands and buildings, firm profit and credit constraint (2018)



Source: Authors’ analysis using survey data

Sectoral heterogeneity was another factor of access to credit. The results in Figure 17 show that the agro-processing subsector was about 28 percent less likely to be credit-constrained. This may imply that, overtime, banks have observed the performance of this sector and learnt trust agro-processing firms.

Figure 17: Sector of activity and credit constraint (2018)

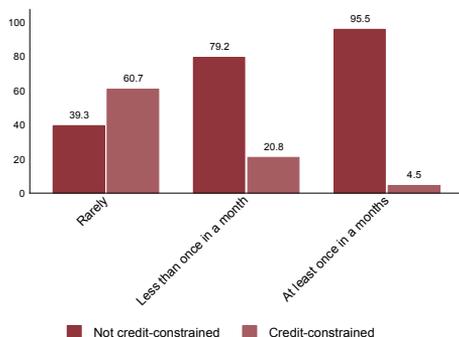


Source: Authors' analysis using survey data.

Last, but not least, the results reveal that bank relationship was another factor of access to credit. Manufacturing firms that maintained good relationship with banks were less likely to be credit constrained. As show in the figure below, the probability of credit-constraint was 40 and 55 percentages higher among firms that rarely visit banks, compared to firms that visit bank on a quarterly or monthly basis. This entails that close relationships of firms with financial institutions alleviate information asymmetry and transaction cost in accessing back credit.



Figure 18: Frequency of bank visit and credit constraint (2018)



Source: Authors' analysis using survey data.

4.2. Empirical findings and discussion

The table below gives the estimation results of the probit regression model based on the survey data. The table shows that most of the coefficient have expected sign, to the exception of INTERNALAUDIT, ACCOUNTINGSTANDARDS, MANAGEREDUCATION, perhaps as a result of potential collinearity with other variables in the model. However, our diagnostic tests suggest that multicollinearity was not a major problem. The coefficients of COMPANYOWNER, COMPSIZE, REGYEAR, NEW_PRODUCT AND BANKVISIT turn out to be significant in the model. Interestingly, financial opacity, firm performance and collateral value do not turn out to be significant predictors of credit constraint in the model.

The positive and significant coefficient of SINGLEOWNER means that the likelihood of credit constraint significantly decreases as manufacturing firm moves from being a sole proprietorship to being a partnership of investors. Table 1 shows that, ceteris paribus, partnership statute significantly decreases the likelihood of firm's credit constraint by 8.9 percent. As discussed earlier, this finding underscores the advantage that certain special characteristics of partnerships (such as financial transparency) procure to firms on the credit market. In the context of Rwanda, this

finding is quite significant, given the important share of sole proprietorships in the manufacturing industry in Rwanda.

Table 1. Estimation results of probit model of credit constraint

<i>Dependent Variable:</i> CONSTRAINT	Marginal effects (dy/dx)	Std. Err.	z	P>z
<i>Independent variables</i>				
SINGLEOWNER	.089	.049	1.81	0.071
COMPSIZE	-.056	.031	-1.81	0.071
REGYEAR	.005	.002	2.59	0.010
EXTERNALLAUDIT	-.260	.161	-1.61	0.107
INTERNALAUDIT	.090	.061	1.48	0.139
ACCOUNTINGSTANDARDS	.205	.137	1.50	0.135
NEW_PRODUCT	.178	.027	6.54	0.000
BANKVISIT	-.071	.014	-5.10	0.000
LANDBUILD	-1.57e-11	1.39e-11	-1.13	0.260
ROE	-.016	.025	-0.64	0.522
<i>Control variables</i>				
MANAGEREDUCATION	.011	.038	0.28	0.776
MANAGEREXPERIENCE	-.000	.002	-0.13	0.898

Sample size: N=122

The negative coefficient of firm size in terms of employment (COMPSIZE) suggests that the probability of a manufacturing firm to be credit-constrained decreases as the firm moves upwards on the firm size ladder, i.e. from micro, to small, medium and large. Moving upwards from one category to another decreases significantly the probability of credit-constraint by 5.6 percent. This finding confirms the hypothesis that small firms face challenges related to insufficient collateral and lending to such firms entail higher transaction costs to the lender. As briefly discussed in the review of literature, similar findings were reported by various empirical investigations across



the globe. In the context of Rwanda, however, this finding is quite new. The fact that the majority of manufacturing firms are in the micro, small and medium enterprise category is therefore an important disadvantage of the manufacturing sector in the credit market.

The positive and significant coefficient of year of registration (REGYEAR) suggests that the likelihood of credit constraint decreases with firm age. The result infers that, other factors remaining unchanged, a one-year increase in firm age significantly decreases firm's probability of being credit-constrained by 0.5 percent. The positive effect of firm age reflects the role played by underlying factors such as length of credit history (i.e. credit score) or perceived survival ability of firm. Similar findings were reported from elsewhere. For Rwanda, the finding gives a positive outlook to the manufacturing sector, given that most manufacturing firms are older (see Section 4.1.1 above). It implies that, as manufacturing firms in Rwanda grow older, their credit constraints will be relaxed.

The NEW_PRODUCT's significantly positive coefficient means that the likelihood of credit constraint increases with introduction of new or improved product on the market. *Ceteris paribus*, the probability of credit constraint increases by 17 percent when a manufacturing firm introduces new products on the market. This is the most important significant predictor of access to credit in the model. As discussed earlier, a new product means that the manufacturer has better information on the performance of the product, which could put the lender at an informational disadvantage and lead to credit rationing. For the case of Rwanda where manufacturing activities are increasingly becoming diversified (as result of substantial competition with imported products), this finding means that innovative manufacturers will be at a disadvantage on credit market.

Lastly, the coefficient of BANKVISIT turns out to be negative and significant, suggesting that the likelihood of credit constraint decreases with number of visits to the bank. Other factors remaining constant, moving from one category of visitors to another decreases the probability of a firm being credit-constrained by 7 percent. To the extent that relationship with bankers is a cost-free investment, this finding provides another positive outlook to Rwandan manufacturers' access to credit.



5. Summary, conclusion and policy implications

This study sets out to analyze the prevalence of credit constraint and investigate firm-level determinants among the manufacturing firms in Rwanda. Data from a survey on the access to finance among 122 manufacturing firms are used to analyze two aspects of credit constraint (namely, credit-discouragement and loan rejection) and investigate firm-specific factors influencing credit constraint. The results of descriptive analyses unveil the importance of banks loans as a relevant source of external financing for about 87 percent of firms. The results further show that around 53 percent of firms applied for loan in the same year, mainly for the purposes of addressing working capital needs (51 percent) and financing new investments (42 percent). However, 22 percent of firms were credit-discouraged, i.e. they had not applied for any loan in 2018 (or before) or had considered bank loan as an irrelevant source of external financing due to fear of rejection. Actual loan rejection rate stood at 17 percent among firms that had applied in 2018. Overall, 27 percent of firms were credit-constrained. Rationing of credit amount stood at 17 percent, with 57 percent of rationed firms receiving between 50 and 75 percent of the amount that they had applied for.

Descriptive analysis of characteristics of credit-constrained firms yields results that are in line with the theoretical expectations. Portraying the lack of sufficient collateral and the higher transaction cost of extending credit to smaller borrowers, the results show that the incidence of credit-constraint was higher by 33 percentage points among micro and small-scale enterprises, compared to medium and large-scale enterprises. Compared to younger firms, the incidence of credit constraint among 10-year and older firms was 18 percentage points lower, given that their longer track records help to build reputational capital that alleviates information asymmetry. In terms of firm management, the incidence of credit-constraint was 15 and 18 percentage points lower among firms that were not managed by their owners and firms managed by university degree holders, as these factors signal the quality of firm management. The prevalence of credit constraints was 30 percentage point lower among externally audited firms, i.e. firms that were less financially opaque. Due to potential moral hazard issues, the incidence of credit constraint was 32 percentage points higher among firms that introduced innovative products on the market. On potential collateral, firms that had no land or building were about 16 percentage points more likely to be credit constrained. Regarding firm performance, firms that



earned 5 million or less in profit before tax were 22 percent more likely to be credit constrained.

To test various hypotheses related to information asymmetry, a probit regression model is used. Overall, the findings suggest that information asymmetry between lenders and manufacturers distorts credit market, leading to supplier's reluctance to extend credit to manufacturer. They show that, *ceteris paribus*, the likelihood of credit constraint decreases with investor partnership, firm size, firm age, bank visit, and increases with firm innovation. In line with the theoretical predictions that firm size signals firm's probability of failure and reduces fixed and proportionate transaction cost of assessing and monitoring credit, the results show that the probability of credit constraint significantly decreases by 5 percent as a firm moves upwards across firm size categories (i.e. micro, small, medium and large). The results also show that one additional year of experience significantly reduces the probability of credit constraint by 0.5 percent, vindicating the hypothesis that longer track record signals firm performance and reputational capital that reduce information asymmetry. The results further show that introducing a new or improved product on the market increases the likelihood of credit constraint by 17 percentage points, as innovation increases information asymmetry and may lead to moral hazard problems or adverse selection. Increasing the frequency of bank visits from "rarely" to "less than once a month" and "at least once in a month", an indicator of intensity of bank relationship, significantly decreases the likelihood of credit constraint by 7 percent.

The main finding that decreased information asymmetry between lender and manufacturer significantly relax credit constraint has important implications for industrial development policies in Rwanda. On the regulator side, they support ongoing policy initiatives to close the information gap between banks and manufacturers such as the credit reference bureau (CRB). However, CRB needs to be strengthened by enhancing its capacity to provide information analytics on manufacturers' credit-worthiness. Concurrent efforts should be made to ensure effective and appropriate use of CRB records by both commercial banks and manufacturers. There is need to make sure that manufacturers' credit scores are effectively used not only for screening and/or monitoring purposes, but also for pricing purposes. Good credit scores should be translated into lower interest rates on loans to reward responsible borrowing, which will ultimately benefit manufacturers. On the manufacturer's side, consumer protection authorities should extend



awareness among manufacturers about credit rating and its potential benefits in terms of access to credit.

The finding that younger and smaller manufacturing firms that are yet to acquire sufficient collateral or good credit histories are more likely to be credit constrained underscores the need for alternative mechanisms to reduce the risk of small-scale lending. For such firms, higher collateral requirements can be reduced with mechanisms such as government-supported guarantee schemes and venture capitals (Ramlogan & Rigby, 2012). This prescription supports the need for extending the interventions of Business Development Fund (BDF) to the manufacturing sector. To support the manufacturing sector growth, BDF's credit guarantee funds needs to be adapted to special needs of manufacturers. Also, BDF will need to enhance its technical capacity to appraise manufacturing businesses.

The finding that firms owned by partnerships of investors do not face as much credit constraint as firms owned by one single investors vindicates the need for extending private and government-sponsored venture capitals to the manufacturing sector. In this vein, the BDF's quasi-equity product needs to be tailor-made to fit the environment under which manufacturers operate. As the experience of some countries prescribes, publicly supported venture capitals could be expanded by tapping into development banks such as Rwanda Development Bank (BRD). Moreover, as supported by the results of descriptive analyses, foreign direct investors can ease firm's access to domestic (and international) credit markets. However, attraction of equity funds requires enhanced corporate governance to improve managerial competence and financial transparency. Therefore, there is need for campaigns to sensitize manufacturing firms on the benefits that proper corporate governance entails. This assertion is supported by the finding that firms that had separated management from ownership and those that were externally audited face lower incidence of credit constraint. It is worth mentioning that these are among the requirements for issuance of corporate bonds to the capital market.



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Financing the manufacturing sector in Rwanda: The potential of capital market

Callixte Kamanzi⁹

Patrick Hitayezu¹⁰

Hoziane Amen¹¹

Sheilla R. Muhongayire¹²

⁹ Economist, Research Department, National Bank of Rwanda

¹⁰ Director, Research Department, National Bank of Rwanda

¹¹ Economist, Monetary Policy Department, National Bank of Rwanda

¹² Senior Economist, Corporate Communications Division, National Bank of Rwanda

Abstract

Manufacturing sector development is crucial for economic growth and structural transformation of economies. While issuing debt securities and equity capital is a cost effective method of raising capital, manufacturing firms in Rwanda have consistently shied away from the capital market. This paper narrates domestic and international experiences on the development of capital markets. The paper also analyses data from a survey of 122 manufacturing firms to understand firm qualification and actual participation. Drawing from insights of the theory of planned behavior, the data are also used to investigate firm's intention to go public based on manager's attitude towards capital markets, subjective norms and perceived behavioral control.

The paper documents significant increase in annual growth in outstanding T-bonds, accompanied with a broadening investor base (from a bank-dominated to a diversified portfolio including institutional investors and retailers). An investigation into actual qualification of Rwandan manufacturing firms suggests that an estimated 38 percent of firms meet the requirements of Rwanda Stock Exchange (RSE). Yet, only 1 percent of firms had issued such commercial papers in the past. The results suggest that most managers fear limited knowledge and loss of control over the company. Nevertheless, managers' attitudes towards capital markets are favorable, as the majority believe that enlisting to RSE would be a wise idea and report that their peers think that they should go public. However, a large share of managers perceives insufficient level of efficacy in controlling factors that facilitate access to capital markets such as administrative fees, managerial or financial skills, and firm reputation. Consequently, only 15 percent of managers intend to enlist in the near future and about 37 percent think that can only enlist in the long term. These findings underscore the need to step up educational campaigns, and advocate the restructuring of manufacturing firm governance towards increased transparency. Furthermore, there is need for increased role of institutional investors (such as Rwanda Development Bank) in easing firms' access to capital markets.

Key words: Capital market, manufacturing sector, theory of planned behavior, Rwanda.

JEL Classification: G1, E44, L16

1. Introduction

As the debate concerning Africa's economic transformation progresses, there is an agreement that manufacturing sector development, backed by reliable sources of finance, is crucial for structural transformation. However, the structure of financial systems in many developing countries tends to be dominated by the banking system (Demirgüç-Kunt & Maksimovic, 2002). The bank-based financing system is more relevant when the scope of information asymmetry between lenders and borrowers is higher, and banks have good expertise to distinguish between low-risk and high-risk borrowers (Beck & Levine, 2002). However, due to the need for information, bank-based systems are biased toward conservative investments, confounding innovation and growth (Beck & Levine, 2002). Domestic capital markets provide an alternative source of funding that can complement bank financing, especially for sectors with continuous technological advances and innovative firm management, and offer better pricing and longer maturities, as well as access to a wider investor base (Beck & Levine, 2002; Narayanaswamy, et al., 2017). International experiences show that capital market has several beneficial features that can enhance industrial development and manufacturing sector in particular (Levine & Zervos, 1998; Khanna, 1978; Laeven, 2014).

The Government of Rwanda has embraced the seven-year program for transformation (2017-2024), to accelerate the transformation and economic growth towards achieving high standards of living for all Rwandans, with the private sector at the helm (MINECOFIN, 2018). The economic transformation pillar in Rwanda entails different priorities, including the creation of decent and productive jobs, by modernizing and increasing the productivity of agriculture and livestock, and by promoting industrialization (Shepherd & Twum, 2018). In the same spirit, the government has taken a number of policies to boost the domestic production for local consumption, improve Rwanda's export competitiveness, and create an enabling environment for Rwanda's industrialization, all aimed at developing the industrial sector. Therefore, a vibrant manufacturing sector is expected to play a crucial role in the above-mentioned transformation journey.

Like many other developing economies, Rwanda mostly relies on the banking sector as a source of finance to the private sector, that accounts for 66.7 percent on average of the total assets of the financial system in the past five years (NBR, 2019). However,



the manufacturing sector development requires sufficient and reliable long-term sources of finance. In 2011, the Government of Rwanda established the capital market to provide an alternative source of finance for firms and big investments that will drive the economy on its path to growth and development. So far, important milestones have been achieved in developing the capital market, starting with a solid foundation of legal and regulatory framework, followed by the quarterly issuance of treasury bonds since 2014, and various awareness campaigns among others.

So far, the number of listed companies is minimal, particularly in the targeted manufacturing sector. It is important to understand why manufacturing firms in Rwanda do not take advantage of capital market's opportunities, given that the lack of financing is a major challenge to the development of the sector.

The present study documents international experiences on the development of capital markets, analyzes factors that limit the manufacturing firms from working with the capital market, and proposes policy recommendations for the case of Rwanda.

The rest of the paper is structured as follows: section 2 describes the development of capital market in Rwanda, section 3 presents the literature review, section 4 documents the experience of countries with developed capital markets, section 5 presents the methodology used, and section 6 discusses the results. The paper ends with section 7 that concludes with some policy recommendations to develop a vibrant capital market in Rwanda.

2. Capital market development in Rwanda

Rwanda's capital market was established under the Capital Market Act of 2011, to take the leading role in the development of capital markets. Prior to the establishment of Capital Market Authority (henceforth, CMA), the Rwanda Capital Market Advisory Council had been established in 2007 to develop the capital market in Rwanda, facilitate the trading of debt and equity securities, enable securities transactions, as well as perform regulatory functions over the Rwanda Securities Exchange



(MINECOFIN, 2019)¹³. Rwanda's capital market has different participants including investors, issuers and intermediaries. The market intermediaries include the Rwanda Stock Exchange, licensed brokers, dealers, and sponsors. At present, a solid foundation has been laid through a legal and regulatory framework, and important milestones have been achieved, despite the prevailing constraints that impede the development of capital market to the desired level.

In an attempt to develop Rwandan bond market, the Government of Rwanda in collaboration with the National Bank of Rwanda (henceforth, NBR) has published its quarterly bond issuance program since February 2014 for maturity period of 2, 3, 5, 7, 10 and 15 years. It plans to offer even longer maturities in the future, starting with 20 years bonds before the end of 2019. As results, annual growth rate in total outstanding T-bonds significantly increased from an average of 9 percent between 2008 and 2013 to an average of 135 percent between 2014 and 2018. Almost all issuances of T-bonds were oversubscribed. The average oversubscription of T-bonds stood at around 200 percent between 2014 and 2018. This signals the increasing desire of Rwandans and foreigners to invest in government securities and demonstrates immense opportunities for savings mobilization presented by the bourse.

The bourse also attracted diverse investors, which actually played a crucial role in the above-mentioned performance. The investor base broadened since 2014, due to collective effort of public awareness campaigns across the country and within the region. As shown in Figure 1, the share of banks in outstanding T-bonds declined from 80.7 percent in 2008 to 32.8 percent by end 2018. During the same period, the share of institutional investors increased from 18.7 to 58 percent, and the share of retail investors increased from 0.6 to 9.2 percent.

¹³ Retrieved from <http://www.minecofin.gov.rw/index.php?id=78>



Figure 1: Composition of T-bond investors (percentage)



Source: Financial markets, NBR, 2018

Eight years down the road, Rwanda Stock Exchange (henceforth, RSE) is slowly emerging among Rwanda’s platform of choice for development capital. The debt market is deepening and so, more companies are showing interest in issuing commercial papers among other products. A total of FRW 97.3 billion were raised through sale of shares of four (4) companies to the public, and FRW 302.75 billion through the issuance of debt securities. As of August 2018, eight companies (of which four are domestic) and 17 bonds were listed on the secondary market. RSE market capitalization stood at FRW 2,893.55 billion (\$3.4 billion) representing 41% of the Rwanda Gross Domestic Product. Based on their expected returns, bonds recorded a higher demand from investors, compared to equities. Despite the good performance, RSE is still nascent and lagging behind other stock exchanges in the region, as shown in the table below.

Table 1: Comparison of regional stock markets and benchmarks.

Stock exchange	Start Period	Listed Companies	Operational period (Years)	Market Capitalization (\$ bn)	Average listings per year
Nairobi Securities Exchange (NSE)	1954	66	64	23	1.03
Dar-Es-Salaam Stock Exchange (DSE)	1996	23	22	11.7	1.04
Uganda Securities Exchange (USE)	1997	17	21	6.4	0.8
Rwanda Stock Exchange (RSE)	2011	8	7	3.4	1.1
Benchmarks					
Stock Exchange of Mauritius (SEM)	1989	95	29	6.8	3.2
Nigerian Stock Exchange (NSE)	1960	184	58	49.4	3.1
Hanoi Stock Exchange (HNX)	2005	1,151	13	6,826.51	88.5

Source: RSE, 2017



One of the biggest challenges is the limited number of borrowers on the capital market. Basic requirements for listing on the bourse include quality governance, whereby a prospective firm should have an active board with a minimum of three members. Also, the firm should have been in operation for the last two years, with books of accounts regularly reviewed by an external auditor. There are some administrative costs that a company has to undertake in order to be able to trade on the capital markets.

A lot of work has been done to assist SMEs access capital market. In 2013, the RSE published special rules pertaining to the listing of SMEs. Currently, some companies are under advisory process in the capital market investment clinic with intention of improving their financial records, and strengthen their corporate governance. These firms are expected to be listed soon. The process takes long because most of SMEs in Rwanda are family owned, with lower levels of corporate governance, accountability and profitability. The same initiative enables prospective companies to understand the potential benefits of capital market finance, and the role of transparency and accountability that goes with it.

Concerning the level of liquidity in the secondary market, various public education sessions were organized by key capital market stakeholders across the country. Information on the importance and benefits of savings and investments through the capital market is spread, with an emphasis on embracing the savings culture. On the other hand, the NBR has facilitated the trading of bonds on secondary market. When an investor needs her/his money back before the maturity date, she/he can trade the T-bonds on the secondary market at RSE with the assistance of brokers. NBR rediscounts the bonds as a last resort at 3 percent below the prevailing market yield or coupon rate, whichever is higher, upon written confirmation that there is no available buyer from RSE.

The Government of Rwanda has granted different fiscal incentives to attract more companies in capital market. Newly listed companies on capital market are taxed for a period of 5 years on the following rates: 20, 25 or 28 percent if company sells 40, 30 or 20 percent of its shares, respectively. Venture capital companies registered with CMA in Rwanda benefit from a corporate income tax of 0 percent for a period of 5 years. Capital gain on secondary market transaction on listed securities is exempted from capital gains tax. The withholding tax on dividends and interest



income on securities listed on capital markets, and interest arising from investments in listed bonds with a maturity of 3 years and above, are reduced to 5 percent lower than withholding tax of 15 percent on other payments.

3. Literature Review

The manufacturing sector is generally argued to be capable of increasing the pace of economic growth, and ensuring swift structural transformations of the economy. This is founded on the fact that it acts as an engine of growth, by broadening the productivity and export base of the economy, reducing unemployment and minimizing rural-urban drift, as well as reducing poverty. According to Victor, et al. (2013), the rapid industrialization and modernization of an economy depends among other things, on easy access to adequate financial resources. Even though, theories linking capital market development to manufacturing sector development are scarce, capital market holds several beneficial features that can enhance the manufacturing sector development.

Financing is important for manufacturing firms given the needs to expand their operations, heighten innovation, investing in production facilities and hiring skilled staff. Many firms that are willing to expand often find it difficult to obtain financing from financial institutions, since the expansion of firms and creation of new ones require huge long term finance, in the form of technology importation, expertise and machineries, which do not normally fit with bank lending conditions (Ibi, et al., 2015). Thus, the importance of the capital market lies in its ability to sustain projects with long-term gestation, which falls within the real conditions of industrial enterprises.

There have been discussions among policymakers on what type of financial system is most conducive to economic growth. Seen from this standpoint, most of the systems of industrial finance in developed countries can be grouped into two clear systems. At one end is the Anglo-American model of market-based finance, where capital markets play an important role and the role of the banking industry is not important. At the other extreme is the Continental/Japanese model of bank-based finance, in which savings flow to their productive uses predominantly through financial intermediaries such as banks and other financial institutions, and the capital market is less important for the raising of funds (Beck, 2003). Studies (Levine &



Beck, 2004; Bist, 2017) show that banks and capital markets are similarly important for economic growth, and each economy should recognize the diversified financial products, instead of relying on single form of finance.

Every economy should recognize the diversified financial products. Banks, for example, are a natural source of working capital, because their resource base essentially emanates from the economy's transaction processes, and the availability of funds are of a short-term nature. Bond markets are relatively more flexible because they can mediate both the short-term corporate funds, as well as long-term household savings. The existence of developed bond markets does however facilitate the bank loan market, where it is often important for corporates to have also bank facilities (Boyd & Smith, 2012; Beck, et al., 2011).

For market-based system, corporate bonds have been widely used in developed economies by firms to raise capital for business activities and debt financing, especially for the long term. It is also a common investment channel for investors who seek stable returns, by holding bonds to maturity or high yield through trading bonds on the secondary market (Felman, et al., 2014). The development of bond markets is the key for the efficiency of the economic system, besides the fact that it would bring more opportunities for investors and deepen the financial markets (Le, et al., 2016). The existence of an effective bond market plays a crucial role in reducing financial sector fragility, and provides an alternative cheap capital for firms (Krishnankutty & Chakraborty, 2014). As it can be seen from the financial crisis during 1997-1998 in Asia, one of the main causes was said to be the over-dependence of the economy on the banking system, as these banks were highly regulated and were sensitive to systematic risks (Buch & Dages, 2018).

Furthermore, corporate bonds are more advantageous to private companies compared to other products, as they provide long-term financing to companies and financial institutions, and offer investment products meeting diverse risk profiles of companies and private investors in general (Çelik, et al., 2019). Corporate bond funding encourages higher standards of corporate disclosure and transparency, and promotes consistent high-quality international corporate governance standards (Burger, et al., 2015). The corporate bond market is more transparent and less volatile than the funding provided by alternative investment vehicles such as hedge funds, which are increasingly competent in filling the gap left by the shrinkage of bank



lending. Additionally, a strong corporate bond market can act as a source of stability, particularly during periods of financial stress, where the freezing up of credit markets are common. The development of deep and liquid corporate bond markets can reduce reliance on bank financing and lead to greater diversification of the sources of funding across various asset classes (Aman, et al., 2019).

Studies from different countries identified some firm-related factors for limitations and unwillingness to work with stock markets in various developing countries. Barriers such as high transaction costs, absence of tax incentives or high taxes, poor saving culture, preference of risk free government bonds, macroeconomic instability, as well as unconducive investment climate are some of the reasons firms are unwilling to participate in the capital market (Ndiritu & Mugivane, 2015). While, the leading limiting firm-based factors are; limited awareness, reluctance to loose company control, lack of trading expertise, poor corporate governance, inadequate knowledge in financial reporting, hence the inability to meet standardized requirements (Ndiritu & Mugivane, 2015). It is therefore necessary to analyze the extent to which these factors have played the role in restraining Rwandan manufacturing firms from accessing capital markets.

4. Lessons and experiences from countries with successful capital markets

Since mid-1990s, capital markets have become an important source of financing for the private sector. After an increase in the awareness of the importance of establishing deep and liquid corporate debt markets, governments have placed this at the top of their agenda (Luengnaruemitchai & Ong1, 2005).

Below are case studies to highlight successful stories from countries with developed corporate bond markets, and suggestions on practices that Rwanda should benchmark to build a strong capital market.

4.1. Singapore

With reference to Ngiam & Loh (2002) and Lian (2002), the Monetary Authority of Singapore introduced major initiatives in 1998 to accelerate the growth of the bond market. Ever since, the bond market in Singapore has increased in size and scope.



The growth in capital markets has complemented bank financing, and provided an alternative intermediation mechanism between savings and enterprises.

The government initially created an appropriate infrastructure, to enable companies to tap in the bond markets for their financial needs. In addition, Singapore Government Securities (henceforth, SGS) issuance program was set up to be a benchmark for corporate bonds with maturities up to 15 years. The government took further steps to increase the liquidity of the SGS market and the number of primary dealers, by establishing a repo facility to support the secondary market activity. International companies were also encouraged to tap into the Singapore dollar (S\$) bond markets, and policies were liberalized to increase the accessibility for S\$ by non-residents. Since 2004, non-residents and non-financial issuers of S\$ bonds and equities were no longer required to swap or convert their S\$ proceeds into foreign currencies, before remitting their proceeds abroad. In the last few years, a wide range of foreign entity issuers have entered Singapore bond market.

In order to provide greater opportunities to the end user, the government facilitated the growth of different products. Particularly, it focused on developing structured products such as asset securitization. The government introduced regulations on capital treatment for asset securitization and credit derivatives, as an alternative form of financing. The government also introduced investment guidelines for insurance companies to be able to invest in credit derivatives for hedging or portfolio management, by enabling them to invest in a wider range of products. The government's tax structure has also been liberalized to facilitate the development of the capital market.

The following approaches enabled Singapore to achieve its dream of aspiring to be the financial centre of Asia, and the third-ranked financial centre in the world, after London and New York in 2015.

i) Articulate long-term goals and build a consensus.

This was accomplished in the late 1990s, where authorities set a top-down vision, to make Singapore Asia's premier full-service financial center. This vision, that was made a national priority, was then linked to achieving social objectives of job creation,



as well as economic objectives of Gross Domestic Product (GDP) growth. Singapore's stock exchanges were merged, and demutualized, while its government bond market was modernized to deepen broader debt markets. The nation also transformed its fund management and private banking industry, by using government-linked investment funds to allocate more money to external managers across different styles.

ii) Create and empower regulatory institutions

It is important to create a coordinating body, as well as its relevant mechanisms and communication processes, to harness and orchestrate the efforts of multiple regulators. In Singapore's case, ownership to execute its government's economic vision was entirely given to Monetary Authority of Singapore (MAS), which was empowered by the government to take all necessary measures to achieve the vision.

iii) Leverage a broad set of stakeholders

No matter how big or small, all stakeholders play an important role in the development of capital markets, and hence their engagement is crucial. Singapore's private sector was actively engaged for inputs regarding policy formulation and implementation, and this was achieved with the set-up of private sector committees over 1997 and 1998. Additionally, the government employed incentives to attract the private sector such as tax exceptions, while foreign financial institutions were also invited to provide advice, with the Financial Sector Review Group (FSRG) established to oversee this change.

iv) Ensure long-term availability of talent and build capabilities.

This is an important yet often-overlooked priority in developing capital markets, as there is much policymakers can do to address short-term issues and prepare for the long term. The 'Contact Singapore' program welcomed foreign talent to Singapore in 1997, as well as formed the 'Singapore Talent Recruitment' (STAR) Committee in 1998. In addition to setting up the Financial Sector Development Fund (FSDF) that subsidized staff training in financial institutions, the government launched numerous



initiatives to reinforce financial and business management capabilities at the undergraduate and graduate levels, and encouraged foreign schools to set up their Asian campuses within Singapore.

v) Invest in strategic promotional activities

While marketing and sales is rarely a core function of regulatory institutions, promotional activities and efforts represent “the critical last mile” to development work. Singapore’s government participated in extensive promotion and transparency in media involvement and public announcements. A separate promotions department was also established for handling roadshows and investor campaigns.

4.2. Malaysia

According to Ibrahim & Wong (2006) and Sekuriti (2004), the development of the Malaysian bond market can be traced back to the 1970s, when the government started issuing bonds to meet the massive funding needs of the country’s development agenda. By mid-1980s, the private sector assumed a more important role in the strategic development of the Malaysian economy, with the aim of becoming the main driver of growth, and the main source of finance. During that period, the corporate sector was heavily reliant on the financing from banks, which led the government to pursue the development of the corporate bond market as a key strategic priority. The 1997-98 Asian financial crisis brought home the inefficiencies of over-relying on bank loans. Lessons learnt from the crisis led the government to step up its efforts of developing the corporate bond market, in order to offer the private sector alternative sources of finance and reduce funding mismatches.

Historically, because of the lack of a well-developed bond market, most of the credit intermediation in the country was through the banking system. Potential credit withdrawals and the eventual credit squeeze suffered by the corporate sector during the Asian crisis highlighted the importance of risk diversification within the financial system. Consequently, the development of the corporate debt market gained greater importance, and was accelerated to allow greater diversification of credit risk among economic agents, as well as to provide funding with the appropriate maturity structures.



In almost 15 years, efforts to develop the Malaysian bond market have been fruitful. In terms of relative size of the bond market versus domestic bank credit, growth in the former has been quite significant. The increasing demand from the private sector for innovative forms of finance continues to fuel the development of Malaysia's corporate bond market. Growth has also been spurred by the increasing presence of institutional investors, such as pension funds, unit trust funds and insurance companies. The building of a comprehensive regulatory framework and a strong infrastructure, along with certainty of vision, political stability and sound macroeconomic policies, laid the foundation for the development of the Malaysian bond market. During the early years, the government agency responsible for corporate bond issuance, took several initiatives to strengthen the legal/regulatory framework and market infrastructure in the underdeveloped primary and secondary markets. Sufficient liquidity and an accommodative interest rate environment have supported the growth of the bond market by enabling the private sector to source funds at a competitive cost. Since 2000 onwards, private debt issuance has exceeded public debt issuance.

To list few, other policy initiatives that made the corporate bond market successful in Malaysia are improved issuance procedures; diversification of the issuer and investor base; sector allocation of corporate bond issuance; improving liquidity in secondary market; increased transparency and fiscal incentives.

4.3. Brazil

Over the years, Brazil has undergone a constant and significant development of its equity and debt capital markets' regulatory framework (Russo & Ferrari Chauffaille, 2018). This has been subject to various amendments and updates in an attempt by the regulators to simplify and modernize rules, promote higher standards of efficiency regarding public offerings, promote the adoption of better corporate governance and foster access to the capital markets by Brazilian issuers and investors.

A number of rules have been enacted in recent years to raise access to the capital markets for the long-term financing of infrastructure projects. Some local companies



relied on public offerings of these types of debt instruments to obtain the funding required for their infrastructure projects. The country also initiated a comprehensive legal framework in terms of securities laws and regulations applicable to investors and each type of equity or debt security.

A number of policy reforms were also implemented. Among these reforms, there was the restructuring of the financial market, the replacement of the traditional trading systems by full electronic trading systems, the enactment of new laws governing the stock market, as well as the revision of the existing laws. In addition, the formation of a regulatory body known as Securities and Exchange Commission (CVM) in 1976 assisted in the creation of a conducive environment for the growth and development of the stock market. Since the implementation of these reforms, the Brazilian stock market has developed significantly in terms of market capitalization, the total value of stocks traded, and the turnover ratio.

The development bank of Brazil played an important role in promoting the firm's access to capital market. The bank provided loans and invested in equities of firms. This is very important in developing countries where the biggest challenge is to have credible, viable and profitable companies due to different factors including weak management. Being involved in equity market investment, development banks have a hands-on approach where they not only provide close project monitoring but are also in a position to nominate Directors to the boards of the companies to which they lend and in which they have an equity stake. They also leveraged resources by attracting other lenders that do not have the same technical capacity to assess a project's viability and potential as well as by providing guarantees.

4.4. Thailand

Prior to the Asian economic crisis in 1997, the function of financial intermediation in Thailand fell almost entirely on commercial banks. Funds were mobilized mainly through bank deposits, while direct financing through the domestic bond market, both public and corporate, was relatively small-scale and undeveloped. Indeed, nine consecutive years of fiscal surplus between 1988 and 1996 provided no incentive for the government to make regular and substantial issues of government bonds



(Ruengvirayudh & Panyanukul, 2006). The limited supply of government bonds inhibited the development of a risk-free benchmark, against which private issuers could price their bonds, which, in turn, impeded the development of the corporate bond market. The 1997 crisis was exacerbated by an imbalance in the structure and operations of Thai financial markets. With limited financing alternatives to bank loans, the business sector in Thailand faced a severe liquidity crunch as the banking sector curtailed its lending operations amid high non-performing loan ratios and recapitalization needs which, in turn, intensified the economic slowdown, as the normal and main channel of funding could not function. Efforts to develop the domestic bond market were given an extra boost by the Thai authorities, who not only had to fiscalize the cost of post-crisis financial restructuring, but also saw the necessity of reducing the economy's reliance on bank intermediation and external financing.

The government noted that a sound market infrastructure is a prerequisite for a properly functioning bond market: it supports active participation and trading, contributing to continuous price discovery and market liquidity, and gives markets more flexibility in an ever-changing environment. The efforts of the Bank of Thailand in this area have been focused on measures to: 1) enhance the role of market-makers; 2) improve the clearing and settlement system; 3) develop risk and liquidity management tools; 4) create electronic trading platforms; and 5) establish a risk-free government bond benchmark for the pricing of bonds.

5. Methodology

This section briefly presents the data used to analyze the perceptions of manufacturing firms' managers vis-à-vis the capital market and to assess firm-based factors that may limit their participation in RSE. The section also briefly describes the analytical framework adopted.

5.1. Data

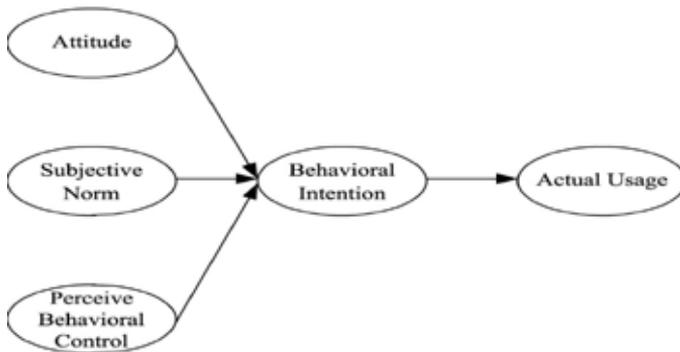
The present study uses data from a survey that was conducted by the NBR during mid-May and June 2019. The data was collected from a sample of 129 industrial firms,

using a structured interview questionnaire. The sample selection followed a 2-stage cluster sampling approach. In the first stage, 12 divisions of activities were selected, based on the International Standard Industrial Classification (ISIC). In the second stage, firms were randomly selected using a simple random sampling method. The sample covered the city of Kigali and all the provinces. Outside Kigali, interviewed firms were from various districts including Rubavu, Rwamagana, Nyagatare, Nyaruguru, Nyamasheke, and Rulindo.

5.2. Analytical framework

To determine the manufacturing firms' perception and intention to work with the capital market, we drew from insights of the theory of planned behavior (Ajzen, 1985; Gopi & Ramayah, 2007) commonly used to analyze the behavioral intention of economic agents under different situations. As presented in the figure below, the theory analyses attitudes, subjective norms and perceived behavioral control, and postulates that these factors influence intention towards adoption.

Figure 2. Schematic representation of the theory of planned behavior



Source: Ajzen (1985)



Behavioral intention consists of motivational factor that underlies the likelihood of adopting a particular behavior. The stronger the intention to perform a certain behavior, the more likely the behavior will be performed. In this study, the following questions were used to measure manufacturer's behavioral intention, and answers were captured using a 7-point Likert scale (from "very likely" to "undecided" and "very unlikely"):

Q1: How likely are you to issue a debt security or equity capital in the next six months?

Q2: How likely are you to issue a debt security or equity capital on the capital market in the long term?

Behavioral attitude refers to the extent to which an individual has a favorable or unfavorable subjective evaluation a certain behavior of interest, considering the outcomes of performing the behavior. In this study, the following statements were used to measure manufacturer's subjective evaluation of the outcome of capital market on a seven-point Likert scale (from "strongly agree" to "neutral" and "strongly disagree"):

S1: Issuing equity capital or debt security on the capital market would be a wise idea.

S1: Issuing equity capital or debt security on the capital market is something easy to learn.

S1: Issuing equity capital or debt security on the capital market saves cost of borrowing funds.

S1: Issuing equity capital or debt security on the capital market would fit well our enterprise's corporate culture.

Subjective norm refers to the belief that many people approve or disapprove the behavior. To capture the manufacturer's belief that peers think she/he should engage with the capital market, we used the following statements, and answers were captured on a seven-point Likert scale (from "strongly agree" to "neutral" and "strongly disagree"):



S1: Managers of model businesses in our industry think that issuing an equity capital or debt security on capital market would be a wise idea.

S2: Our business partners think that issuing an equity capital or debt security on capital market would be a wise idea.

Perceived behavioral control captures an individual belief about the difficulty or ease of performing the concerned behavior. To capture manufacturer's perceived individual efficacy in controlling factors that inhibit or facilitate participation in capital market, this study used the following statements, and answers were captured on a seven-point Likert scale (from "strongly agree" to "neutral" and "strongly disagree").

S1: My enterprise has the required managerial skills to issue an equity capital or debt security on the capital market.

S2: My enterprise has the required reputation to attract investors in equity capital or debt securities.

S3: My enterprise employs the required financial accounting standards to issue and manage an equity capital or debt security.

S4: My enterprise has the willingness to disclose publicly its financial information in order to issue equity capital or debt security on the capital market.

S5: My enterprise has sufficient resources to pay fees and commissions on the capital market and it important to us.

6. Results and discussion

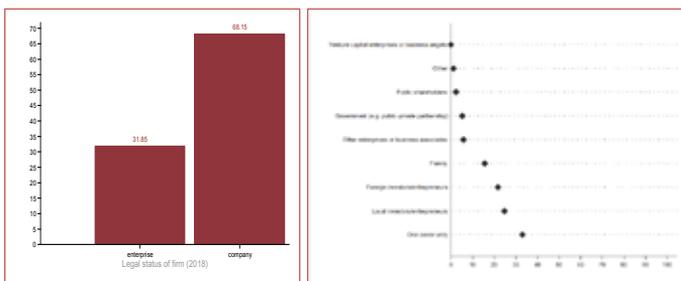
This section presents the results of descriptive analysis of survey data to understand the extent to which manufacturing firms actually qualify to participate on the capital market as borrowers and manufacturers' perceptions and attitudes towards capital markets.

6.1. Characteristics of manufacturing firms vis-à-vis requirements for enlisting on the capital market

One of the basic requirements for firms to qualify for listing on RSE is the legal status. Firms must be registered as company limited by shares. Analysis of data on registration type of manufacturing firms in Rwanda indicates that, by 2018, 68 percent of firms were registered as companies, while 32 percent were enterprises (i.e. under sole proprietorship statute). Consistent with their legal status, the analysis reveals a diverse ownership structure, with single investors owning around 33 percent of manufacturing firms. This finding suggests that, on the basis of legal status, nearly 65 percent of Rwandan manufacturing firms qualify to enlist on RSE.

Further analysis of ownership structure reveals that despite the fact that family-owned firms accounted for 15.5 percent of the total manufacturing sector, about 24 and 21 percent of manufacturing firms were owned by groups of local and foreign investors, respectively. Foreign investment, in particular, often increases firm visibility and reputation, which could give it an added advantage on RSE.

Figure 3: Manufacturing firms' legal statutes and ownership

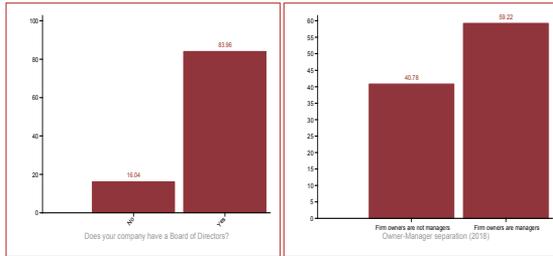


Source: Authors' analysis using survey data.

On the requirements of an active board of directors with a minimum of three members, the results from the survey reveal that 16 percent of registered manufacturing companies do not have a functioning board of directors, which is also against Rwanda's company law. This finding suggests that, on the basis of board of directors, the vast majority of Rwandan manufacturing firms qualify. One result that

standout is that 59 percent of manufacturing firms are managed by their owners, which is against the principle of separation of ownership and management. This issue often results into challenges related to the evaluation of manager’s performance.

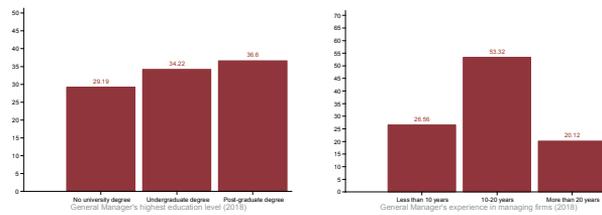
Figure 4: Manufacturing firms’ governance and management in Rwanda



Source: Authors’ analysis using data from survey.

In terms of managerial and financial skills required to understand operations of the capital market, assessment of managers’ level of education indicates that majority of firms are managed by university degree holders. Only 29 percent of managers had no university degree. The rest held undergraduate (34 percent) or postgraduate (37 percent) degrees. In terms of experience, 73 percent of general managers had more than 10 years of experience with firm management. The level of education and experience of managers, therefore was not a hindrance to firm’s access to capital market.

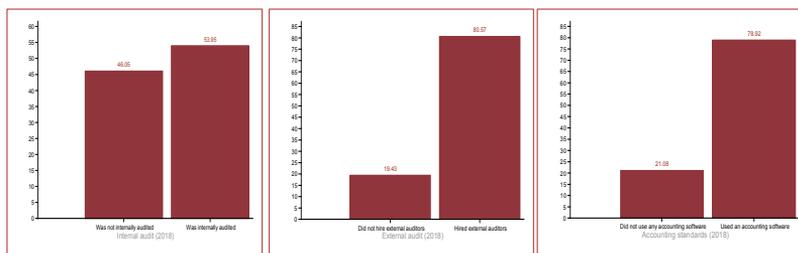
Figure 5: Firm manager’s education and experience (2018)



Source: Authors’ analysis using data from survey.

Another important requirement for a company to trade with capital market relates to financial transparency. Prospective firms must have been in operation for the last two years, with books of accounts regularly reviewed by an external auditor. In this regard, the results suggest that, by 2018, nearly 93 percent of firms were two years or older. On financial transparency, the results in Figure 6 show that nearly 81 percent of manufacturing firms were externally audited in 2018. Moreover, 79 percent of firms used the standard accounting software during the reference period. Therefore, financial opacity was not a hindrance to the financial disclosure required for participation of manufacturing firms on the bourse.

Figure 6: Usage of internal audit, external audit, and accounting software



Source: Authors' analysis using data from survey.

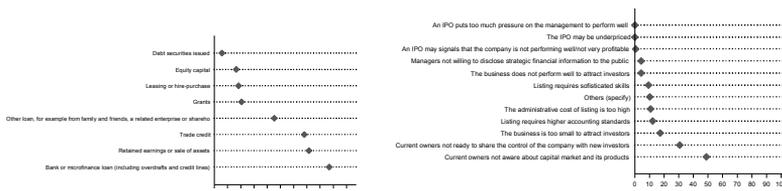
Overall, by 2018, the percentage of firms that fulfilled the basic requirements to go public is estimated at 38 percent of manufacturing firms in Rwanda. It is therefore important to investigate their actual participation rates, and their perceived challenges, and future intentions.

6.2. Participation on the capital market and self-reported challenges

Although more than 33 percent of manufacturing firms fulfil the basic requirements, the results in Figure 7 indicate that only 16 and 5 percent, respectively, consider issuing equity capital and debt security as relevant sources of external financing. Bank and microfinance loan remain the dominant source of financing for manufacturers. Further analysis shows that, as of 2018, only 1 percent of firms had actually participated on the capital market as borrowers.



Figure 7: Relevant sources of financing and reasons why capital market is not relevant (2018)



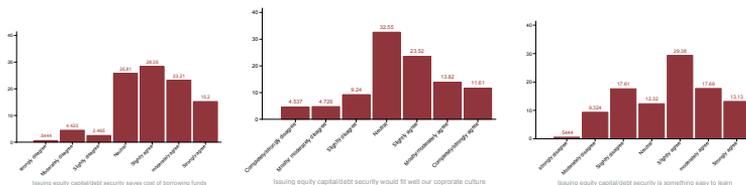
Source: Authors' analysis using data from survey

Figure 7 also dives into self-reported reasons why capital market is not a relevant source of external financing, showing that 49 percent of manufacturers fear limited knowledge on capital markets, while 30 percent of them fear losing control over their firms. Only 17 percent thought that their business is too small to enlist on the bourse.

6.3. Manager's attitude towards capital markets

Generally, manufacturing firm managers demonstrate a favorable attitude towards capital market. The results indicate that only 17 percent of firms do not believe that issuing a debt security or equity capital on the market would be a wise idea. However, Figure 8 shows that 37 percent of managers disagree with the statement that capital market eases the cost of borrowing funds. Moreover, about 40 and 50 percent of managers, respectively, are uncertain as to whether issuing a debt security or equity capital would be easy to learn and would fit well their corporate culture. These results are consistent with the earlier finding showing that lack of knowledge and fear of losing control over the company are the most important self-reported reasons why capital market is not an option for the majority of manufacturing firms. They suggest that managers consider positively the outcome of participation on the capital market but fear certain characteristics of the bourse itself, notably skills requirements and sharing of company control.

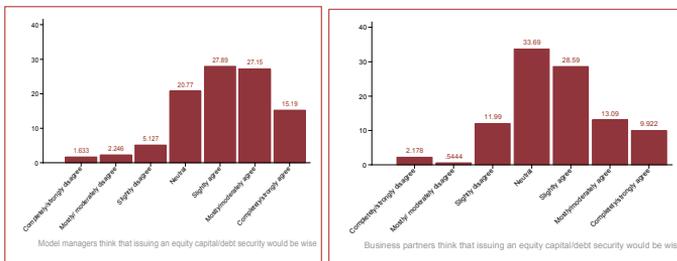
Figure 8: Firm manager’s attitude towards capital market (2018)



Source: Authors’ analysis using survey data

Analysis of subjective norms in Figure 9 suggest that 70 and 50 percent of managers, respectively, agree with the statements that model managers in the industry and their business partners think that issuing commercial papers would be a wise idea. This finding suggests that, in general, manufacturers believe that their peers think that they should enlist on the bourse. The belief that enlisting on the capital market is a normal behavior, in conjunction with the positive favorable attitude towards the merit of capital markets documented earlier constitute a potential psychological conduit of manufacturer’s intentions to enlist on the capital market. It is therefore important to understand how managers perceive their efficacy in controlling factors that inhibit or facilitate participation in the capital market.

Figure 9: Subjective norms about capital market

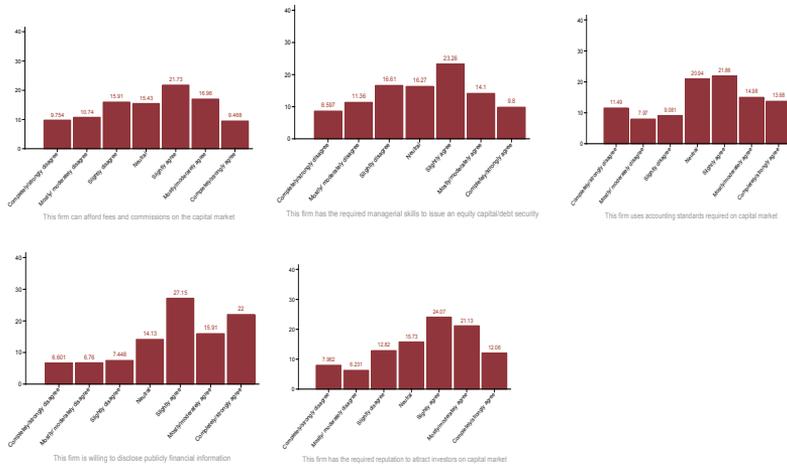


Source: Authors’ analysis using data from survey

The results in Figure 10 show lower levels of agreement with statements related to manufacturers’ efficacy in controlling factors that facilitate access to the bourse.

Notably, about 51 percent of managers perceive that their firms cannot afford the administration fees. About 53 percent of managers do not believe that they are competent to perform financial operations required on the capital market, and around 50 percent disagree with the statement that their firms use appropriate accounting standards. Nearly 48 percent of firm managers do not believe that their firms have the required reputation to attract potential investors on the market. Interestingly, 65 percent believe that disclosing financial statements is not an issue, suggesting that most manufacturers do not perceive financial privacy as an issue. This finding suggests that manufacturers believe higher levels of technical difficulties when listing on capital markets.

Figure 10: Subjective norms about capital market



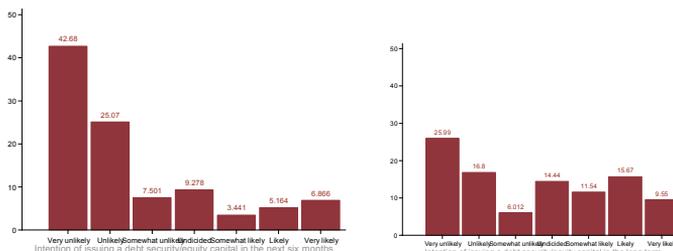
Source: Authors' analysis using data from survey

6.4. Manager’s intention to enlist

As the theory of planned behavior suggests, the behavioral factors described above could have direct consequences on the manager’s intention to enlist on RSE. The perceived weaker behavioral control over factors that facilitate access to capital markets, in particular, could be a demotivating factor capable of abating manager’s perceived likelihood of enlisting on RSE.

The results in Figure 11 confirm this assertion by showing weaker intentions to enlists on the capital market. Only 15 percent of manufacturing firms had intention to enlist on the capital market in the near future, which is consistent with the finding that only 16 and 5 percent, respectively, consider issuing equity capital and debt security as relevant sources of external financing. Nevertheless, the share of manufacturers willing to enlist on the capital market slightly increases with time horizon. As Figure 11 shows, nearly 37 percent of managers intended to enlist in the long term. This finding suggest that, other factors remaining unchanged, widespread participation of manufacturing firms on the bourse will not likely take place in the near future.

Figure 11: Behavioral intention to participate on the capital market



Source: Authors’ analysis using data from survey



7. Conclusion and policy recommendations

This paper highlights the role of capital market in the financing of economies, focusing on the financing of manufacturing firms. International experiences reflect the importance of developing deep and liquid capital markets, to reduce the reliance on bank financing, and create diversified sources of funding for firms. More importantly, an effective corporate bond market has played a crucial role in reducing financial sector vulnerabilities, and provided alternative cheap capital with long-term maturities for firms. The development of a deep and liquid capital market comes as a solution to the credit constraints faced by manufacturing firms in Rwanda.

Despite the universal recognition that capital markets are the most pragmatic and cost-effective method of raising capital, manufacturing firms in Rwanda have shied away of the capital market. This study provides an empirical investigation into the confounding factors.

In terms of actual qualification, the results show that the majority of firms are registered as companies, have board of directors, are run by educated managers, hire external auditors, use standard accounting software, and have been in operation for more than two years. An estimated 38 percent of manufacturing firms could meet the requirements of RSE. However, only about 15 percent of firms consider debt security or equity capital as a relevant source of finance, and only 1 percent has actually issued such commercial papers in the past. Analysis of self-reported hindrances suggest that most managers fear limited knowledge and loss of control over the company.

Further analysis unveils some favorable attitudes towards capital market, as 83 percent of manager believe that enlisting would be a wise idea. Moreover, most managers believe that their peers think that they should go public. However, a larger share of managers does not perceive sufficient level of efficacy in controlling factors that facilitate access to capital markets such as administrative fees, managerial or financial skills, and reputation. Consequently, only 15 percent had the intention to enlist in the near future. About 37 percent think that can only enlist in the long term.

The combination of results from the data analysis, and experience from countries with developed capital markets brought forth many policy recommendations, for the development of a vibrant capital market in Rwanda to build well-diversified sources of finance, for a transformative manufacturing sector and economy in general.



- (i) The lack of awareness on Rwanda stock exchange operations is a major hindrance to corporate participation in stock market. The CMA has responded to the challenge of firms with public education, by hosting workshops on themes pertinent to the development of capital markets, giving presentations at professional and business functions, using different media platforms, and publishing annual reports available to all market players. However, there is need of continuous, vigorous and consistent nationwide educational campaigns to corporations, business communities, sensitizing the benefits of investing in the capital market. Many other different players, including local government institutions, the Ministry of Education, the Public Sector Federation, etc. should facilitate and be involved in this necessary and long process of educating Rwandans on general benefits of savings and working with capital market.
- (ii) Given that, the ownership and management structure of manufacturing firms is still a hindrance for firms to enlist, there is a need of improving transparency and boosting investor confidence in companies requesting funds through capital market. The clinic programs already in place should continue to offer technical assistance and guidance to firms, in order to bring on board small and medium size firms in the capital market.
- (iii) In order to diversify the market participants, the government should involve different institutions such as Rwanda Development Bank, pension and insurance sectors. These institutions have played a big role in the development of capital market in countries like Brazil and Singapore. More importantly, the government should ensure that each institution involved in the capital market development has clear responsibilities and has played its role. The accountability should therefore be enforced in every financial year, with clear assessment of the achievements made.
- (iv) A sound market infrastructure is a prerequisite for a properly functioning bond market. It supports active participation and trading, contributing to continuous price discovery and market liquidity, and gives markets more flexibility in an ever-changing environment. Automation not only minimizes inefficiencies associated with manual systems, it also reduces the costs of transacting, increases trading activity, liquidity in the stock markets, and speeds up operations. The efforts in this area should focus on measures to improve the clearing and settlement system, develop risk and liquidity



management tools, create electronic trading platforms, and continue the establishment of risk-free government bond benchmark for the pricing of bonds with various maturity.

- (v) Attract capital flows and encourage foreign participation: As government sustains its ambition of developing capital markets industry through its quarterly bond issuances, there is need of various government bonds with different purpose to attract more investors from different economic groups. Examples: Diaspora Bonds, Municipal Bonds, Mobile Phones users bonds, Green Bonds etc. This strategy has contributed to the development of capital market in Nigeria, Ethiopia, Kenya and other more Asian market including Hanoi (Vietnam), Singapore and Malaysia.

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Rwanda current account deficit sustainability: An external sustainability approach

Yves Muvunyi¹⁴

Patrice Sebera¹⁵

Emmanuel Bahati Ngrambe¹⁶

¹⁴ Statistician, Statistics Department, National Bank of Rwanda

¹⁵ Senior Economist, Monetary Policy Department, National Bank of Rwanda

¹⁶ Statistician, Statistics Department, National Bank of Rwanda



Abstract

The aim of this paper is to assess the current account sustainability of Rwanda, using the External Sustainability method, developed by the Consultative Group on Exchange Rate Issues at the International Monetary Fund. This approach determines the current account to GDP ratio that would stabilize the Net Foreign Assets to GDP position over the medium term at a benchmark or desired level. It uses data covering the period from 2010 to 2018 as actual numbers and 2019 to 2021 as medium-term projections. The findings show that the current account gap in 2017 (at the benchmark) between the actual current account deficit that would prevail under current policies and the current account balance that would stabilize the Net Foreign Assets position drift apart by 2.3 percent, before falling to 0.6 percent in 2018. It then averages 0.8 percent during 2019-2021, suggesting a small increase in external debts over the medium term.

Key words: Current Account Deficits, Real Exchange Rate, Net Foreign Assets, External Sustainability.

JEL classification: F31, F32



1. Introduction

The current account deficit of a country is an important economic factor, as it refers to a mirror to its levels of indebtedness to the rest of the world and the capacity of the country to fund that deficit (Baharumshah, et al., 2005). Therefore, a sustainable current account deficit refers to a stable level of the total net foreign assets of a country, hence a stable level of investment position of a country. Policymakers and researchers project the current account deficit as an expected imbalance, and not as an optimal outcome of demand of goods, services and return on investments between resident country and the rest of the world.

The current account deficit is used in different areas of policy formulations. From the point of view of monetary policy, the analysis of the current account deficit makes it possible to follow the evolution of prices, the transmission of economic shocks and thus the establishment of a monetary policy framework to stabilize prices (Kigabo & Mutuyimana, 2016). With regard to the financial sector, the current account deficit contributes to the identification of credit risks to the financial stability, since the economy relies on foreign capital to fund the deficit. Economies with large current account deficit spend more on imports than the income from exports. In the short-run, investors benefit to lend to such economies, but in the long run, the questions of sustainability are considered, and it may slow down foreign capital inflows. This affects scarce domestic savings, business in domestic economies, hence the credit risks rise.

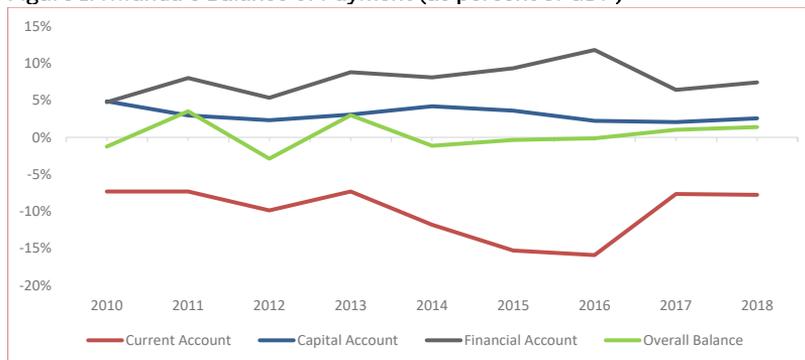
In addition, understanding the short and long term fundamental determinants of the current account deficit is of a particular importance, as it serves as a policy target with regards to the Balance of Payments sustainability. Generally, the performance of the current account deficit depends on the demand and supply factors of a country's trade, for instance, on the simultaneity between the change in income and price, as relevant variables that are elastic to it (Rahmaddi & Ichihashi, 2012), and the magnitude at which they affect the change in the current account deficit. The Marshall-Lerner condition explains that the effectiveness of foreign trade policy is primarily dependent on income and price elasticity of exports and imports. As a measure of the relative prices, the real exchange rate is one of the most important and strategic macroeconomic fundamental that plays a key role in ensuring a country to remain competitive in international trade. It is considered as a strategic tool of



economic regulation that maybe formulated in such a way to influence commercial policies and international trade competitiveness of an economy (Ndung'u & Durevall, 2011).

Rwanda current account deficit averages 10.0 percent of Gross Domestic Product (henceforth, GDP) in the last nine years (2010-2018) as shown in the graph 1 below, peaking at 16 percent of GDP in 2016. The Rwanda's balance of payment figure shows that the financing of the current account deficit comes mostly from the accumulation of foreign liabilities in the financial account than in the reduction of the country's reserve assets.

Figure 1: Rwanda's Balance of Payment (as percent of GDP)



Source: National Bank of Rwanda

Given the fact that Rwanda's current account has been in deficit, which leads to an accumulation of foreign liabilities. It is important to think about an optimum level of the current account deficit that would stabilize the Net Foreign Assets (henceforth, NFA) at a particular benchmark level, assuming that the current account will respond to an adjustment in the income and real exchange rate.

Nuwagira and Muvunyi (2016) assessed the impact of the exchange rate in the external sector using two indicators, namely the exchange rate misalignment and the Marshall-Lerner condition, derived from a long-run Behavioral Equilibrium Exchange Rate. Their results show that though exchange rate impacts trade balance, the

Marshall – Lerner condition does not hold for Rwanda, as the Rwanda trade depends much on change in income than the change in prices.

The current paper uses the External Sustainability (ES) model, developed by the Consultative Group on Exchange Rate Issues (Rajan, 2006). The ES estimates the difference between the actual current account balance and the balance that would stabilize the NFA position, at some benchmark level (Rangarajan & Mishra, 2014). Therefore, this study assesses the sustainability of the Rwandan current account deficit over the medium term.

The rest of this paper is structured as follow: Section 2 summarizes the overview of the external sector and the exchange rate developments in Rwanda. Section 3 discusses the literature review around the three methods used by the Consultative Group on Exchange Rate Issues, by the International Monetary Fund. Section 4 discusses the methodology adopted in this paper (ES). Section 5 presents the results and interpretation, while section 6 concludes and discusses a way forward of the study.

2. Rwanda External Sector and Exchange Rate Developments

The Current Account

The current account balance helps to measure the international economic behavior of a country, as an indicator of the balance between national saving and investment behaviors. Economic theories indicate that whether current account deficit is beneficial or detrimental to the economy, it depends on factors that drive it (Kariuki, 2009). The current account measures current payments (outflows) and current receipts (inflows) between residents of a country and the rest of the world, and it comprises factors of income, transfers and transactions of goods and services.

As in most developing countries, Rwanda records a persistent current account deficit of an average of 10.0 percent of GDP in the last nine years (2010 – 2018). The Rwanda current account deficit follows the trade liberalization of goods, services and capital flows. Therefore, due to increase in foreign investment to promote domestic production in industry sector, the increase of imports of capital and intermediate



goods (as major factor of productivity) creates the increase in trade deficit, hence current account deficit, outweighing the secondary income surplus.

Exports of goods have increased significantly during the last nine years to 11.9 percent of GDP in 2018 from 5.1 percent of GDP 2010 mainly attributed to diversification towards other exports categories such as the non-traditional exports and the re-exports of goods. This has contributed to reduce the country's overdependence on traditional exports, such as coffee, tea and minerals. Exports of goods average 8.7 percent of GDP in the period under review, with a dropdown in 2015/16, due to weak external demand that resulted into dropped international prices of the main exports commodities. Similarly, exports of services increased to 9.6 percent of GDP in 2018 from 6.6 percent of GDP in 2010 thanks to high investments in tourism sector and air transports.

Although, exports have grown dramatically, imports have also been kept high mostly due to high investments in some revenue generating sectors (e.g. construction of big hotels and Rwandair). Imports of goods recorded an average of 22.8 percent of GDP for the same period largely dominated by demand for capital goods and intermediary goods (industrial inputs) in line with the Government policy program to promote local production. In addition, the imports of services are dominated by payments on services such as transports (largely on road transportation of goods due to geographical location constraints), construction (construction of big hotels and infrastructure projects) and other services (partly operating leases by Rwandair) dominate.

Besides, adding to the current account deficit is the net investment income payments made to non-residents investors in form of interests, retained earnings and dividends. However, the contribution of investment income to current account deficit remains moderate, (it accounts for, on average, 4.1 percent of total current account debits during 2010-2018, of which income on investments represents half of the payments. The increase in these payments outweigh recorded surplus from secondary income. This records public and private transfers (including remittances), and it stands at an average surplus of 8.2 percent of GDP, for the period under review.



Table 1: Current Account Components (as percent of GDP)

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Current Account	-7.3%	-7.3%	-9.9%	-7.3%	-11.8%	-15.3%	-15.9%	-7.7%	-7.8%
1. Goods	-13.4%	-16.6%	-17.1%	-15.1%	-15.8%	-14.9%	-15.4%	-9.1%	-9.5%
Exports	5.1%	7.0%	8.0%	9.2%	9.0%	8.2%	8.5%	11.5%	11.9%
Imports	18.5%	23.6%	25.1%	24.3%	24.9%	23.1%	23.9%	20.6%	21.4%
2. Services	-2.9%	-1.8%	0.2%	-0.2%	-0.8%	-3.9%	-3.1%	-1.7%	-1.7%
Credit	6.6%	7.1%	7.0%	7.6%	7.4%	9.5%	9.5%	10.2%	9.6%
Debit	9.5%	9.0%	6.8%	7.8%	8.2%	13.4%	12.5%	11.9%	11.3%
3. Primary Income	-0.9%	-0.9%	-1.4%	-1.7%	-2.4%	-2.9%	-3.6%	-3.4%	-3.4%
4. Secondary Income	9.9%	12.0%	8.5%	9.7%	7.2%	6.5%	6.2%	6.5%	6.9%

Source: National Bank of Rwanda

As indicated, the Rwanda current account needs financial inflows to fund its deficit, through an increase foreign liabilities and/or decrease of foreign assets. Looking at the trend of the current account deficit as percent of GDP, this has averaged 10 percent of GDP between 2010 and 2018, which resulted into higher financial inflows.

The Capital Account and the Financial Account

To finance the current account deficit, the country uses foreign assets, liabilities and grants, which are recorded under capital account and financial account (IMF, 2009). The financial account measures the increase or decreases in international ownership of financial assets and liabilities, which are subject to return on investment. The capital account records nonfinancial flows of capital transfers, which are not meant to produce return on investment back to donors. The increase in financial inflows affect the end period position of the level of International Investment Position of a country, while the increase in capital transfers do not accumulate as assets or liabilities, related to foreign donors.

Rwanda's balance of payments indicates that financial flows continue to be the main source of financing the current account deficit, recording an average net borrowing of 7.8 percent of GDP in the last nine years (2010 – 2018), as shown in table 2 below. The capital transfer oscillated around 3.0 percent of GDP.



The financial flows are mainly driven by the direct investment and other investments (mostly external borrowings). The direct investments kept an average net flows of 3.1 percent of GDP, for the period under review. Rwanda has continued to attract more capital inflows due to pull factors (business enablement, security and stable macroeconomic conditions) and push factors (driven by monetary policy in developed countries). The World Bank Group ranks Rwanda at the 29th position of the World Ease of Doing Business in 2019, 2nd position in Africa and 1st position in East African Community (WBG, 2018), from the 139th position in 2009, 18th position in Africa and 3rd position in East African Community (WBG, 2008).

The other investments are mainly composed of net private and public external borrowing. They recorded an average of 4.6 percent of GDP for the same period. Therefore, the accumulation of the financial flows brings the total net foreign assets at a borrowing of 50.8 percent of GDP in 2017, and estimated at 54.0 percent in 2018.

Table 2: Capital and Financial Account, Flows and Stocks (as percent GDP)

	2010	2011	2012	2013	2014	2015	2016	2017	2018 *
A. Net Flows ("+" means net borrower / "-" net lender)									
1. Capital Account	4.9%	3.0%	2.3%	3.1%	4.2%	3.6%	2.2%	2.1%	2.6%
2. Financial Account	4.8%	8.0%	5.3%	8.8%	8.1%	9.3%	11.8%	6.4%	7.4% *
Direct Investment	4.3%	1.8%	3.4%	3.4%	3.9%	2.7%	2.6%	2.8%	3.0% *
Portfolio Investment	0.1%	1.3%	0.1%	0.0%	0.0%	0.1%	0.1%	-0.8%	-0.2%
Other Investment	0.4%	4.9%	1.8%	5.4%	4.2%	6.6%	9.2%	4.4%	4.6% *
3. Reserve Assets	-1.2%	3.5%	-2.9%	3.0%	-1.1%	-0.3%	-0.1%	1.0%	1.4%
B. Net Stocks ("+" means Assets > Liabilities)									
Net Foreign Assets	-8.4%	-8.6%	-15.9%	-22.9%	-30.2%	-38.0%	-46.1%	-	-54.0% *
1. Assets	18.4%	22.5%	17.0%	19.6%	17.3%	15.5%	16.8%	18.1%	20.7% *
2. Liabilities	26.8%	31.0%	32.9%	42.6%	47.5%	53.5%	62.9%	68.9%	74.7% *
Direct Investment	-7.0%	-7.3%	-9.5%	-10.8%	-14.2%	-16.7%	-18.9%	-20.5%	-22.8% *
Portfolio Investment	0.3%	-1.0%	-1.0%	-1.0%	-0.9%	-1.0%	-1.0%	-0.2%	0.0% *
Other Investment	-15.6%	-16.1%	-16.8%	-25.2%	-27.0%	-31.5%	-37.8%	-42.8%	-45.1% *
Reserve Assets	13.9%	15.8%	11.4%	14.0%	11.9%	11.1%	11.8%	12.7%	13.9% *

Source: National Bank of Rwanda (*: means estimation)

The gross official reserves assets hold by the National Bank of Rwanda (henceforth, NBR) help to protect the country against external shocks, The level has oscillated around the coverage between 4 to 5 months of next year imports of goods and

services, with a lower level in 2014 and 2015, followed by a recovering period of 2016 through 2018, as indicated on graph 2 below.

Figure 2: Gross official Reserve Assets as month of imports



Source: National Bank of Rwanda

The Exchange Rate

The exchange rate regime determines the rules that govern central bank behavior in the foreign exchange market. The real exchange rate determines the relative of domestic and foreign goods and thus the composition of absorption and production between the two types of goods. The real exchange rate can stabilize aggregate demand in response to shocks by mitigating the effects of changes in absorption on aggregate demand for domestic goods. A fixed nominal exchange rate serves to anchor inflationary expectations, since it is tied to another country's currency, and it keeps the value of a currency within a determined band. A stable real exchange rate reduces the uncertainty associated with international trade, and a stable nominal exchange rate reduces the uncertainty associated with capital flows (Montiel, 2011).

The nominal effective exchange rate (henceforth, NEER) is an indicator of competitiveness in terms of foreign exchange rate with the trading partners. The NEER is an unadjusted weighted geometric average rate for the domestic currency for a basket of major trading countries' currencies. A domestic currency may depreciate in nominal terms, but if the domestic inflation is lower than the one in trading countries, then the domestic market is better competitive. This is why we



need to take into consideration the effect of domestic inflation against trading countries' inflation.

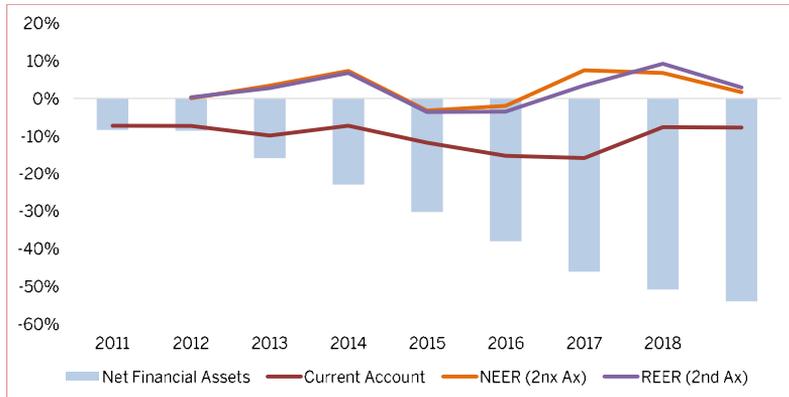
Therefore, we deflate the NEER by the price indices, and we have the real effective exchange rate (henceforth, REER). The REER is the weighted geometric average of a domestic currency in relation to a basket of major trading countries' currencies, adjusted for the effect of inflation in both countries.

Since 1998, the NBR has committed more resolutely on the economic liberalization. By Decree-Law No SP1 of March 3, 1995 on the organization and management of the foreign exchange market, it has adopted a floating (or flexible) exchange rates regime¹⁷. The objective of this flexible regime aims at approaching as much as possible the exchange rate equilibrium level; to stabilize prices and support growth; and to restore connection between Rwandan foreign exchange market and the international money markets, by referring to the average of interbank exchange rate toward a greater liberalization of foreign exchange transactions.

On the graph 3, we compare the trend of NEER and REER vis-à-vis the development of the current account deficit and the net foreign assets, and we see that toward the end of 2018, the magnitude of the REER depreciation was moderate, compared to previous year. The explanation of this trend is the improvement of the current account deficit, following a deep worsen in the previous years (2015 – 2016).

¹⁷ This can be found at the National Bank of Rwanda's website: www.bnr.rw

Figure 3: Nominal and Real Exchange Rate (% growth) vs. CA & NFA (% GDP)



Source: National Bank of Rwanda

In addition, as Montiel (2011) explains, currency crises create macroeconomic instability, as this creates instabilities in exchange rate, meaning that one unit of a domestic currency no longer buys as much as it used to in a foreign currency. Even in the absence of currency crises, the real exchange rate depreciation volatility tends to obscure the equilibrium value of the real exchange rate and trade in goods, and it undermines the efficient allocation of resources between the traded and non-traded goods sectors. Rwanda real effective exchange rate growth shows minimum volatility. This gives Rwandan currency strength to adjust to foreign currency crises and insure a stable trade in goods balance, and macroeconomic stability.

3. Literature review

For integration of macroeconomic sectors, exchange rates plays an important role in the external adjustments process. According International Monetary Fund's Consultative Group on Exchange Rate Issues (Rajan, 2006), there are three complementary approaches to assess the current account and exchange rate, namely: a Macroeconomic Balance Approach, a Reduced Form Equilibrium Real Exchange Rate Approach, and an External Sustainability Approach. For the purpose



of this paper, we highlight the first two approaches, and focus more on the third approach.

The ES approach also remains along the lines of the framework described in the External Balance Assessment (EBA) (Phillips, et al., 2013) and the External Sustainability (ES) methodology developed by IMF's Consultative Group on Exchange Rate Issues (CGER) (Lee, et al., 2008).

The macroeconomic balance (MB) approach has been used for several of years as the main approach for assessing the current account and exchange rate behavior (Rajan, 2006). The MB calculates the difference between the projected medium-term current account balance at prevailing exchange rates and an estimated equilibrium current account balance, or "CA norm". The exchange rate adjustment that eliminates this difference in the medium term is then obtained by using the current account elasticity by country against the real exchange rate.

The reduced form equilibrium real exchange rate (ERER) approach directly estimates the an equilibrium real exchange rate for each country according to medium term fundamentals, such as the country's position in NFA, productivity differential relative between the tradable and non-tradable sectors, and the terms of trade¹⁸ (Rajan, 2006). The exchange rate adjustment needed to restore equilibrium over the medium term is, then, simply calculated as the difference between the estimated equilibrium real exchange rate and its current value.

The external sustainability (ES) approach complements the two other methodologies by focusing on the relation between the sustainability of a country's external stock and its current flow, trade balance and real exchange rate. The ES approach calculates the difference between the actual current account balance and the balance that would stabilize the NFA position of the country at some benchmark level (Raghuram, 2006). Based on the aforementioned trade elasticity, this difference is translated onto the real exchange rate adjustment that –over the medium term– would bring the current account balance in line with its NFA stabilizing level, under a

¹⁸ *The fundamentals are expected to play a role over the medium term even though exchange rates are essentially unpredictable in the near term (Meese and Rogoff (1983)). Hence, short term effects of capital flows would eventually disappear, while their medium term effects should be captured by the underlying fundamentals.*



particular assumption about the economy's medium term growth rate. Unlike the MB and ERE approaches, which rely on econometric estimation, the ES approach requires only a few assumptions about the economy's potential growth rate, inflation rate, and rates of return on external assets and liabilities.

Marola (2016) explained in detail the ES approach, given the relationship between the net external position, the non-income current account plus net capital transfers and the real exchange rate. His approach consists of determining the non-income current account over GDP that would stabilize a benchmark net foreign assets position over the medium term, and a gap by comparing the net foreign assets stabilizing non-income current account to GDP with the non-income current account projected over the medium term in Latin America, assuming no real exchange rate misalignments. Then, he calculated the real effective exchange rate misalignment to stabilize the net foreign assets position over GDP for the medium term projections, on the basis of considering a semi-elasticity to the real exchange rate to trade in goods and services, assuming no elasticity with the current and capital transfers. In addition, he addressed the role of the returns differential in explaining the channels through which the external sustainability adjustment might occur. He concluded that when the rate of return on assets equals the rate of return on liabilities, the external sustainability adjustment can only occur through the trade channel, and when they differ, the adjustment must be on both trade and financial channels.

Wright (2013) examines measures of the equilibrium Real Exchange Rate using both MB and the Natural ERE Approaches, with a longitudinal panel econometric model on four countries from western hemisphere that have macroeconomic similarities (managed floating exchange rate, similar income per capita and level of openness). He found that there were several intervals of exchange rate misalignment for each country. The exchange rate misalignment series were found to be stationary, meaning an existence of a long-run equilibrium mean and a constant variance for exchange rate misalignment. However, he found that the current account deficit had not responded to this misalignment. He suggested that disequilibrium in the exchange rate should be adjusted, and further studies should evaluate structural factors that determine the current account deficit, rather than focusing on price competitiveness.



In addition, Wright (2013) found that the critical factors influencing the sustainable levels of the current account included a country's NFA to GDP ratio, relative productivity growth, labor force participation and fuel to GDP ratio. World economic crisis periods were also found to significantly reduce the sustainable levels of the current account, which can be explained by shocks to the flow of capital during these periods. The results also revealed that there have been a number of years over the sample period where the current account for the various countries has been significantly misaligned.

Bussiere, et al. (2010) used the three approaches to dig further into econometric models related to these approaches, and suggested some methodological advances to address them. They highlighted some issues that may occur in these approaches, such as the presence of a model uncertainty in deriving benchmarks for the current account norms (for MB approach), the uncertainty around exports and imports elasticity's to real exchange rate depreciations and the uncertainty around the use of a reduced form relationship for the real exchange rate (for ERER approach). They suggested that researchers should apply a model combination technics using Bayesian averaging approach (for MB approach). Researchers should also collect all plausible of shocks in order to re-arrange the trade elasticity's model, and proceed with panel estimation technics to address cross-sectional correlation issues (for ERER approach).

According Rajan (2006), the implications of the ES approach are straightforward. Debtor economies that grow faster can afford to run larger current account deficits and smaller trade balances without increasing their ratio of external liabilities to GDP. In addition, high rates of return on external assets and liabilities imply that debtor countries need larger trade balances (and creditor countries can afford larger deficits) to stabilize the external position. Finally, economies that earn lower rates of return on their assets than they pay out on their liabilities must – other things being equal – run larger trade surpluses to stabilize their net foreign assets.

Zakarya (2014) assess the Current Account Sustainability in the West African Economic and Monetary Union Countries (henceforth, WAEMU), with the estimator of the Least Square Dummy Variable Corrected (LSDVC) over the 1980–2004 period. The results show the persistence of the current account deficit in the WAEMU area. The simulations -built on the fitted values of significant determinants of the current



account balance- show that the projected medium-term current account balance drifts apart from the external debt-stabilizing current account balance over the medium-term; suggesting the increase of external debt-GDP ratios in the member countries to sustain the projected current account deficit levels. This increasing trend in the external debt GDP ratios, due to the inflows of foreign capitals, leads to the calculation of the extent of adjustments to sustain the current account deficit. On average, the magnitude of adjustments is higher when the benchmark level for the external debt is lower than the WAEMU convergence norm.

4. Methodology

4.1. External Sustainability Method

To assess the current account sustainability and exchange rate competitiveness, this paper uses the IMF's External Balance (ES) Assessment Methodology (Cubeddu, et al., 2019). The ES approach seeks to determine the current account to GDP ratio that would stabilize the NFA to GDP position over the medium term at a benchmark or desired level, as opposed to identifying the current account or REER level consistent with fundamentals and desired policies.

It consists of three steps. The first involves determining the trade or current account balance to GDP ratios that would stabilize the net foreign asset position at determined benchmark values. The second step compares these NFA stabilizing trade or current account balances with the level of a country's trade or current account balance expected to prevail over the medium term. Finally, the third step consists of assessing the adjustment in the real effective exchange rate that is needed to close the gap between the medium term trade and current account balances and the NFA stabilizing trade and current account balances.

The change of NFA position between two consecutive periods can be expressed as a function of the current account balance (CA) and NFA valuation changes (VC), leaving aside errors and omissions:

$$NFA_t - NFA_{t-1} = CA_t + VC_t \quad (1)$$

Because the ES approach takes a forward-looking view, the CA level that would keep the NFA to GDP ratio constant, and valuation changes are unpredictable for the most part, it can be assumed that $VC_t = 0$. Expressing the previous expression in term of ratio to GDP yields:

$$nfa_t - \frac{1}{(1+\pi_t)(1+g_t)} nfa_{t-1} = ca_t \quad (2)$$

Where: g_t is the growth rate of real GDP and π_t is the inflation rate. Further, decomposing the current account balance into net exports and transfers (nxt), and net interest payments (assuming the same real rate of return r on both lagged external assets and liabilities), the above equation can be written as:

$$nfa_t = nxt_t + \frac{1+r_t}{1+g_t} nfa_{t-1} \quad (3)$$

This expression illustrates the risk of unsustainable dynamics of the NFA to GDP ratio whenever $r > g$ on a sustained basis. In the steady state, denoting variables without a time subscript, the current account balance (ca) and net exports and transfers balance (nxt) that stabilize the NFA to GDP ratio at a given nfa level are:

$$ca = \left(1 - \frac{1}{(1+\pi)(1+g)}\right) nfa \quad (4)$$

Or,

$$nxt = -\frac{r-g}{1+g} nfa \quad (5)$$

Equation (4) and (5) shed light on a few interesting features:

- For a debtor economy ($nfa < 0$), a lower growth rate requires a higher current account balance or higher net exports and transfers balance to stabilize the NFA to GDP ratio at a benchmark level.
- Similarly, for a debtor economy, a higher rate of return on external assets and liabilities requires a higher net exports and transfers balance to stabilize the NFA to GDP ratio at a benchmark level (Cubeddu, et al., 2019).



5. Data and Results

5.1. External Sustainability

This study uses Rwandan annual data covering the period from 2010 to 2018 as actual numbers and 2019 to 2021 as medium-term projections sourced from the NBR, the Ministry of Finance and Economic Planning (MINECOFIN) and the National Institute of Statistics in Rwanda (NISR). The key variables and assumptions to assess the current account sustainability and exchange rate competitiveness using the external sustainability approach include the medium-term stocks of Net Foreign Assets, the current account deficit as a ratio to GDP, the real GDP growth(gt), the inflation rate(πt), and rate of return on external assets and liabilities(r).

Choice of a benchmark or desired NFA/GDP level.

Clearly, the benchmark level of net foreign assets is a key element in the assessment of current account balance (or exchange rate). In most cases, the benchmark NFA level is set equal to the current or last year's level. However, for countries with large net debtor positions (and high sustainability risk), a benchmark NFA level consistent with a stronger external position is recommended, with the precise level information of the total country NFA.

In this paper, we will use the NFA at end 2017 as the benchmark level, which is the latest year for which complete data are available, and it is equal to 50.8 percent of GDP. The stabilization of the NFA position at end 2017 level shows us a useful perspective that the projected Rwanda current account deficit at the current exchange rates is expected to add marginally to the country's debts in the medium-term. The total NFA represents the stocks of the net borrowing that includes stocks of direct investments, portfolio investments, loans, deposits, reserves assets, special drawing rights and other investments.

Derivation of the current account balance that stabilizes NFA position at its benchmark level.

The computation of the NFA stabilizing current account uses formula (4) using measures for medium term inflation and medium term potential growth. For the



calculation, we consider the medium-term average inflation rate of 5 percent and the real GDP growth rate of 8 percent (assumed to be the potential output growth rate consistent with the current country integrated macroeconomic framework).

Determination of the current account gap.

The CA gap is the difference between the forecasted medium-term current account that would prevail under current policies, and the current account balance that would stabilize the NFA position at its benchmark level. The table below highlights the relationship between the NFA stabilizing current account balance and the projected medium-term current account. We see that the gap between the actual current account deficit and the NFA stabilizing current account deficit narrows since 2017, standing to 2.3 percent points and 0.6 percent point in 2018 and averages 0.8 percent point over the medium term (2019-2021). The results show that the condition of stability of the current account is not far from being satisfied.

Table 3: Determination of the current account gap

Period	Current Account including Capital Transfers		
	Medium-	Stabilizing NFA at 2017 level as % GDP (-50.8%)	Gap
2017	-5.6	-3.2	-2.3
2018	-5.2	-4.5	-0.6
2019	-7.0	-5.8	-1.2
2020	-7.2	-6.1	-1.1
2021	-6.3	-6.1	-0.2

Source: National Bank of Rwanda

For a full comparison, we compiled the level of trade balance that stabilize the NFA at the 2017 benchmark in the annex. We see that the big share of the gap shown above comes from the gap caused by trade balance. These results match the findings that Rwanda current account deficit is mainly driven by the deficit from trade in goods. As a result, for the country to narrow the current account deficit it needs to develop policies aiming to reduce its trade deficit.

Calculation of the corresponding REER gap (i.e. REER adjustment needed to close the above current account gap).

A key input of external sector assessments is the country-specific CA-REER elasticity, which allows to translate an estimated CA gap into a consistent REER gap, and to compare results with the historical results on the CA-REER elasticity research for Nuwagira and Muvunyi (2016). However, the semi-elasticity estimates can vary over time depending on a country's structural features (such as the degree of trade openness, impact of international prices to trade, production input as commodity dependence, etc.). In this paper, we estimate the semi-elasticity of CA/GDP ratio with respect to REER as:

$$\frac{\Delta(CA/GDP)}{\Delta REER/REER} = \beta_{TB} + \beta_{IB} \quad (6)$$

Where: β_{TB} is the semi-elasticity to trade balance of goods and services: $\beta_{TB} = \frac{\Delta(TB/GDP)}{\Delta REER/REER}$ and β_{IB} is the semi-elasticity of the income balance: $\beta_{IB} = \frac{\Delta(IB/GDP)}{\Delta REER/REER}$

Therefore, assuming that the current account gap will be closed by an adjustment in the trade balance, the corresponding REER gap (in percentage terms) can be derived as:

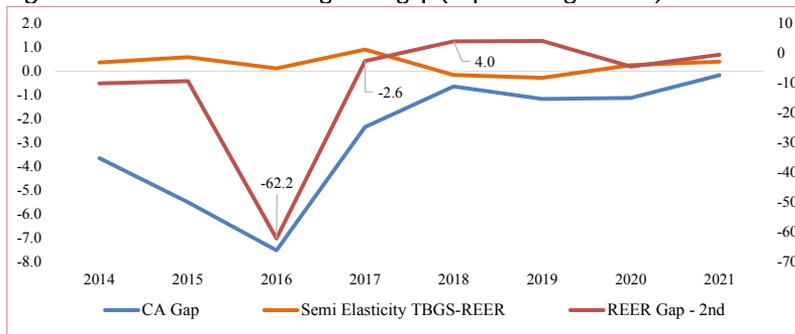
$$REER^{gap} = \frac{CA^{gap}}{\beta_{TB}} \quad (7)$$

Where β_{TB} is the semi-elasticity of the nominal trade balance of goods and services (as a percent of GDP), estimated as follow:

$$\beta_{TB} = \beta_X S_X - \beta_M S_M \quad (8)$$

Where: $\beta_X = \frac{\Delta(\frac{X}{GDP})/(\frac{X}{GDP})}{\Delta REER/REER} = 0.2$ and $\beta_M = \frac{\Delta(\frac{M}{GDP})/(\frac{M}{GDP})}{\Delta REER/REER} = -0.7$ are the elasticities on nominal exports/GDP and imports/GDP ratios with respect to the REER, and $S_X = 0.2$ and $S_M = 0.3$ are the nominal shares of exports and imports with respect to GDP. The semi-elasticity the trade balance is equal to $\beta_{TB} = 0.25$. Therefore, the REER gap is estimated to be equal to $REER^{gap} = -2.6$ in 2017.

Figure 4: Real effective exchange rate gap (in percentage terms)



Source: Authors' estimation

Comparing the updated estimated semi-elasticity with those estimated before by Nuwagira and Muvunyi (2016), we see that that the exchange rate changes though significant, do not have a bigger impact on Rwanda's trade balance. This is a small country assumption, where Rwanda can buy and sell its main products at the international market without influencing the global commodities price.

5.2. Test of substitution effect

The substitution effect shows how consumers are willing to deviate from demand of certain goods to another preference, due to increase in price, where consumers replace the more expensive items to less costly, with or without much changes in quality and quantity.

Theoretically, the effect of exchange rate depreciation on exports and imports of goods depends on the elasticity of the real exchange rate depreciation on trade. However, as shown by Nuwagira and Muvunyi (2016), the Marshall-Lerner condition for Rwanda does not hold, and the substitution effect on trade is very inelastic to trade in goods, compared to income. They used the maximum likelihood method of cointegration to estimate the elasticities of trade in goods to real exchange rate depreciation and income.

In this paper, we estimate two equations, for exports-exchange rate and imports-exchange rate elasticities for Rwanda, using normalized quarterly data from 2010Q1 to 2018Q4, and an ordinary least square methodology to estimate the equations. These equations are as follow:

$$\ln Exp_t = \alpha_1 * \ln REER_t + \beta_1 * \ln Wd.GDP_t + \varepsilon_t \quad (9)$$

$$\ln Imp_t = \alpha_2 * \ln REER_t + \beta_2 * \ln Rw.GDP_t + \varepsilon_t \quad (10)$$

We regress the logarithm of exports volume ($\ln Exp_t$) on real effective exchange rate ($\ln REER_t$) and the sum of real GDP of trading partners ($\ln Wd.GDP_t$ -- as a proxy of foreign demand of Rwanda exports), and the imports volume ($\ln Imp_t$) is regressed on the real effective exchange rate and Rwanda real GDP ($\ln Rw.GDP_t$ -- as a proxy of domestic demand of imports). The results are summarized in the table below:

Table 4: Logarithm of exports and imports volume on the REER and Rwanda real GDP

	Ln.Exp Goods	[t-statistics]	Ln.Imp Goods	[t-statistics]
lnREER	0.19	[3.14]	-0.05	[-0.47]
lnRwGDP			0.98	[10.09]
lnWdGDP	0.82	[13.64]		
R-Square	0.95		0.89	
F-statistics		320.21		123.51

Source: Authors' estimation

The table above summarizes the results of elasticities estimated. For the exports equation we see that, Rwanda exports of goods is more elastic on external demand than depreciation of real effective exchange rate. This shows that Rwanda could collect more revenues by developing policies aimed at increasing domestic supply and diversify its exports along the products space and across markets. On imports side, the results show that the domestic demand of imports of goods depends mostly on income than the change in relative price.



6. Conclusion and way forward

In this paper, we used the External Sustainability model aims to determine the gap between the projected medium-term current account deficit and the stabilizing NFA current account deficit. The comparison drawn with the projected current account deficit over the medium term and the stabilizing current account deficit pointed out a small discrepancy between the two current accounts imbalances.

The general results show that current account gap is not far from stabilizing averaging 0.8 percent over the medium term. This finding indicates that the external debt-GDP ratios will not highly increase over the medium term to sustain the projected current account deficit levels.

The results from the External Sustainability approach provide useful insights when debtor or creditor positions are deemed excessively large, and where further widening of these positions is unwarranted. This is notably the case for countries where large debtor positions put external sustainability at risk. A key strength of the approach is that it requires a limited number of variables and assumptions, such as medium term GDP growth, inflation, and rates of return on external assets and liabilities.

The results of this paper show that Rwanda trade responds more to income than depreciation of real exchange rate. In other words, income elasticity on trade is greater than the price elasticity. Therefore, the economy should explore opportunities for better and sustainable strategies to increase domestic production. This will reduce the current account deficit and its vulnerabilities, and it will help to avoid import prices induced by the nominal exchange rate depreciation both in short and long term. This long-term solution implies that Rwanda should proceed to expenditure switching by consuming domestically. In addition, close monitoring of exchange rate remains vital to avoid higher levels of volatility.

Lastly, policies to attract capital inflows made essentially with concessional and long-term flows are equally crucial, as they would reduce short-term borrowings-equity flows and short-term loans. The latter are prone to reversals and high borrowing costs than long-term foreign investments inflows. Therefore, in order to attract these long-term flows, the country should ensure stable macroeconomic and business friendly environment.



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Annex

We derive a more complete link between the trade balance, net foreign assets and rates of return on external assets and liabilities. To determine the trade balance that stabilizes net foreign assets, we need to consider the income balance, which depends on the NFA itself and on yields on external assets and liabilities. We derive the level of trade balance that stabilizes NFA at the benchmark level. We need to determine the levels of assets and liabilities that were calculated when we had the benchmark level of NFA for 2017. Assuming that the ratio among different assets and liabilities remain constant at the level prevailing in the benchmark all along the medium projection, we thereby derive one trade balance composition that stabilizes the net foreign assets using the following formula:

$$b_{gst}^s = -\frac{i^{EQA} - n_t}{1 + n_t} a^{EQA_s} - \frac{i^{DA} - n_t}{1 + n_t} a^{DA_s} + \frac{i^{EQL} - n_t}{1 + n_t} a^{EQL_s} + \frac{i^{DL} - n_t}{1 + n_t} a^{DL_s}$$

Where:

b_{gst}^s : is the trade in goods, services and transfer that stabilize NFA

i : are rate of return on assets (A) and liabilities (L), separate instrument by equity (EQ) and debt (D)

a & l : are the assets and liabilities stocks (% of GDP), sub-components of the total NFA, and separate instrument by equity (EQ) and debt (D).

$1 + n_t = (1 + g_t)(1 + \pi_t)$: Real GDP and inflation

Table 5: Balance of trade in goods, services and transfers

Period	Balance of trade in goods, services and transfers		
	Medium-term	Stabilizing NFA at 2017 level as % GDP (-50.8%)	Gap
2017	-3.0	0.6	-3.5
2018	-2.7	-1.1	-1.5
2019	-4.1	-2.3	-1.8
2020	-4.0	-2.6	-1.3
2021	-2.86	-2.89	0.03



The table above summaries that in previous years, there were significant gaps between the NFA-stabilizing trade balance and its actual levels. These gaps particularly appear at periods with high trade deficit.

National Bank of Rwanda

KN 6 AV. 4

P.O. Box: 531 Kigali, Rwanda

Tel: (+250) 788 199 000

Email: info@bnr.rw

Swiftcode: BNRWRWRW

Twitter: [@CentralBankRw](https://twitter.com/CentralBankRw)

Website: www.bnr.rw